

1911 • FIFTY YEARS OF SERVICE TO COAL MINING • 1961

COAL AGE

SEPTEMBER, 1961

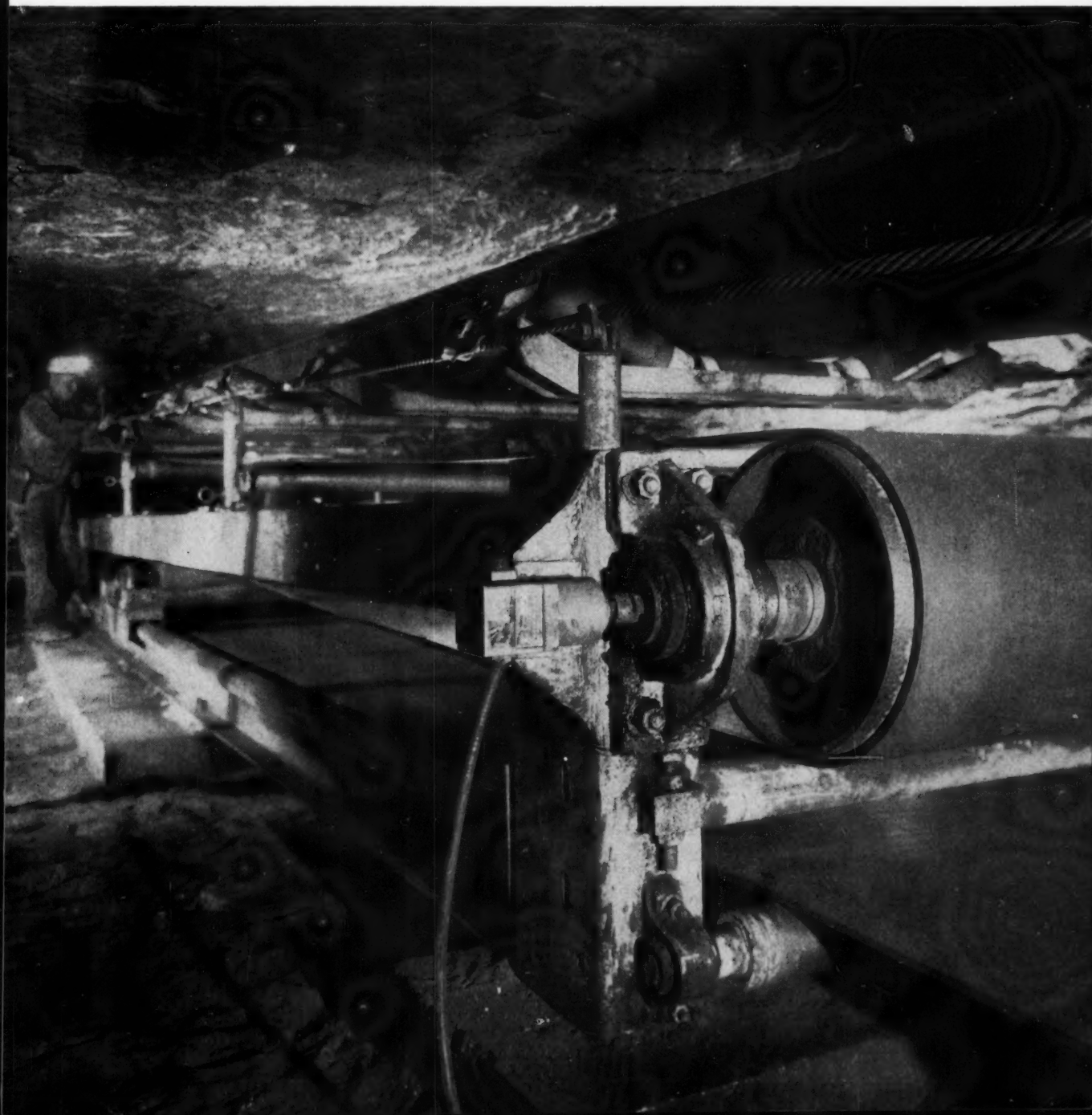
The Greenwood Story . . p 56

Jigging With Air p 62

Mulga's New Portal . . . p 94

A MCGRAW-HILL PUBLICATION

PRICE \$1



An Independent Survey Shows:

8 out of 9 mines agree...

Fire-Resistant Fluids . . . What 100% Users Have Found

Equal or better production, no pump problems, lower consumption of hydraulic fluid and lower cost of fluid per ton cited as major benefits from emulsion-type fire-resistant fluids.

HOW DOES emulsion-type fire-resistant hydraulic fluid stack up in underground service? How does equipment perform? What about fluid consumption, handling procedures, storage and cost per ton? To get the answers to these and other questions frequently asked about fire-resistant fluids, *Coal Age* first checked with the manufacturers of approved fluids to arrive at the number of operations using such fluids 100%. This and other checking turned up 13 mines 100% on fire-resistant emulsions as of July 1. All 13 were approached by *Coal Age*. Nine provided data.

The nine mines which supplied data on their experience to date operate in Kentucky, Pennsylvania and West Virginia. Capacities, derived from data in *Keystone Coal Buyers Manual*, a *Coal Age* affiliate, are as follows:

Mine	Capacity, Tons per Day
	4,500
1	1,000
2	1,200
3	2,250
4	2,250
5	4,300
6	1,300
7	1,000
8	1,500
9	

It should be noted that eight of the nine mines use one brand of pre-mixed emulsion. Therefore, the great majority of the data to follow pertain to this one fluid.

Most of the mines were visited by a member of the *Coal Age* staff; others supplied detailed answers to

a series of questions designed to bring out experience and results.

The term "100%" is subject to some exceptions. One mine at the time of the survey was keeping one section on conventional fluid until the supply on hand was used up, at which time it planned to go completely emulsion.

Some of the mines have been 100% users of fire-resistant fluid for more than 8 mo, others have used it for 5 to 6 mo and a few have had several months experience. Although

The above is an excerpt from an article in the August issue of *Coal Age* (p. 55). This article is of tremendous importance to all coal mine operators. Eight of the nine mines reporting use Hul-E-Mul exclusively.

BOX SCORE

Mines using Hul-E-Mul
100% hydraulically 17

Other mines partially using
Hul-E-Mul 59

reason, do not operate normally. An added benefit cited by one company is lower operating temperature for equipment as well as excellent performance and response.

What about pump life?

No pump problems resulting from use of the emulsion type fluid have been reported during the period in which the fluid has been used. Several companies say that, although no pump troubles have been noted, they have not had the fire-resistant fluid in service long enough to reach a conclusion.

The majority, however, believe they have had enough experience and therefore have formed opinions. One company, for example, has been using the emulsion-type fluid for 6 mo and reports that no pumps failed. Another notes that pump troubles have been non-existent in the 3 mo that the emulsion type fluid has been used. It adds that some pump trouble could normally be expected in this period.

Pump and motor life are better than with premium-quality petroleum oil, reports another operator. The company has not had the failures sometimes experienced with conventional fluid.

After conventional fluid was replaced with the emulsion-type fluid, a very significant reduction of 75% in fluid loss through a leaking pump was noted at another company.

HUL-E-MUL

FIRE-RESISTANT HYDRAULIC FLUID
A product of HULBURT OIL & GREASE COMPANY
Philadelphia 34, Pennsylvania



Rubber mattress for bed of coal

B. F. Goodrich lining reduces chute maintenance costs by two-thirds

Two thousand tons of coal a day cascade down that 21-foot chute and into the coal breaker. At first, the chute was lined with $\frac{3}{8}$ " thick steel plates for protection. But the pounding, grinding action of the chunky coal cut through the plates in 4 to 6 weeks. The frequent replacements were costly. Welding the plates onto the chute was troublesome.

When a B. F. Goodrich distributor heard of the problem, he recommended that the chutes be lined with Armorite, a rubber especially compounded by B. F. Goodrich to stand terrific abra-

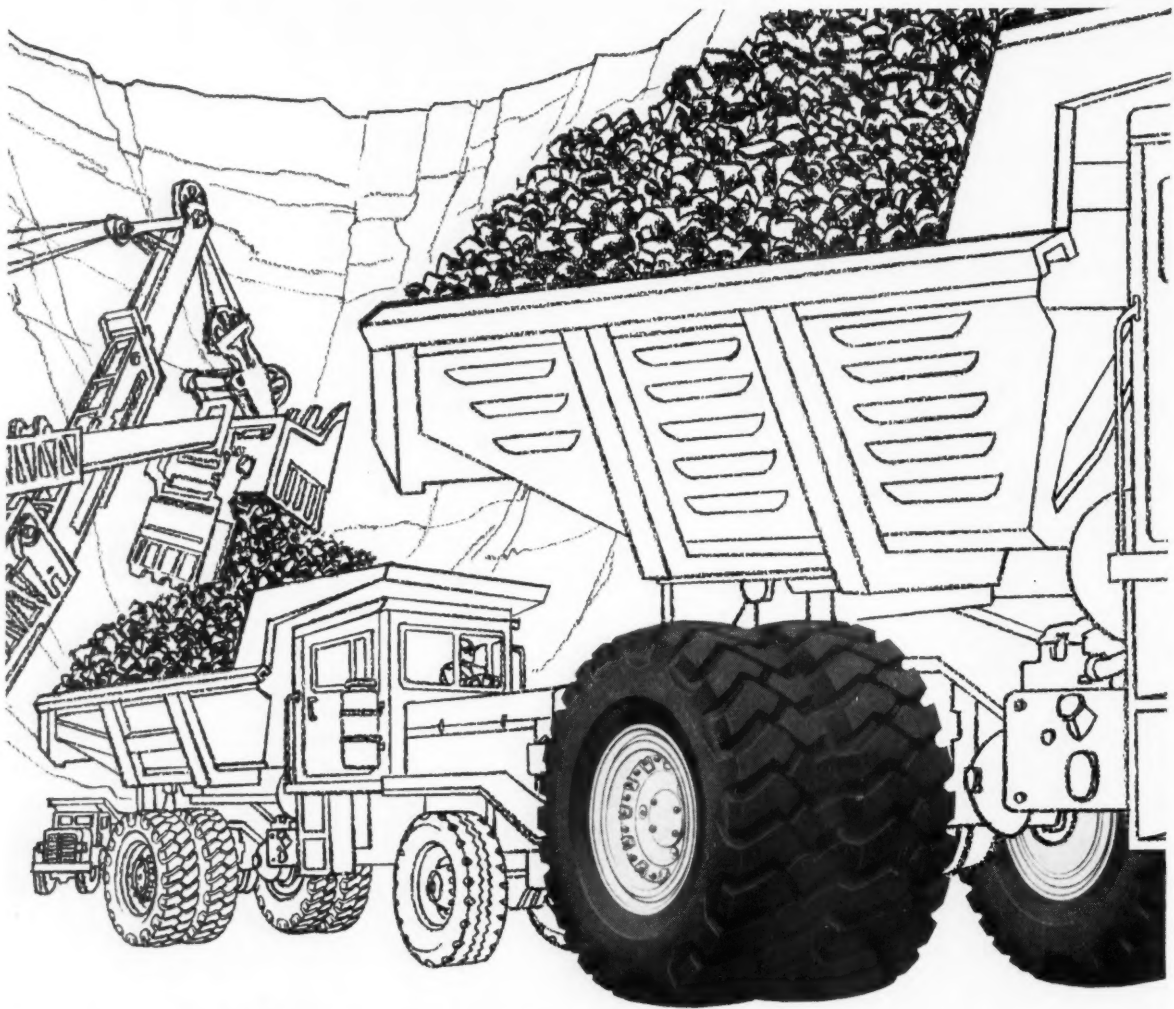
sion. Armorite is tough, yet soft so the jagged chunks of coal bounce off it, even though they hit with great force.

Installing it was simply a matter of bolting it to the chute. Result? Instead of lasting just a few weeks, Armorite took the wear and tear for more than 5 months, carried 260,000 tons of coal, reduced chute maintenance costs by at least two-thirds.

B. F. Goodrich Armorite can be used in dozens of ways—as a liner, curtain or throw mat for protection against abrasives. Can be ordered with or without a reinforcing back of fabric, fiber or steel.

Your B. F. Goodrich distributor has full information. And, as a factory-trained specialist in rubber products, he can answer your questions about any of the products BFG makes for industry. *B. F. Goodrich Industrial Products Co., Dept. M-150, Akron 18, Ohio.*





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You'll save money and beat downtime when your coal tonnage rolls on Firestone SUPER ROCK GRIP DEEP TREAD tires. Shock-Fortified nylon cord bodies armor these rugged tires against haul impact to keep your coal equipment working. Extra cut-resistance is built into Firestone tires, too, with long-wear-

ing Firestone Rubber-X. This exclusive cord-body and rubber combination gives your coal trucks new staying power under big loads, in the roughest conditions. Put Firestone tires on your coal hauling equipment—and get the backing of fast on-the-job service—from your nearby Firestone Dealer or Store.

Always Specify Firestone Tires When Ordering New Equipment.

Firestone

FIRST IN OFF-THE-HIGHWAY TIRE NEEDS

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all the way, with*

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10

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A Material Control Certificate included with every shipment of Republic Roof Bolts states specific physical properties of the bolts you receive... no guesswork... positive statement of strength, identified by steel heat number.



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Q

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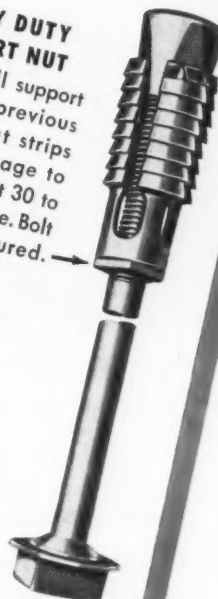
Wide, strong leaves insure extra holding power—provide wedge-like grip. Narrow base supports make expansion easy.



J

HEAVY DUTY SUPPORT NUT

Better shell support than any previous method. Nut strips without damage to bolt threads at 30 to 50 ft.-lbs. torque. Bolt tension is assured.



K

ENGINEERED EXPANSION
Precision-tapered plus, with exact degree of taper needed for effective tightening.



Strong
Modern
Dependable

...and here's your hole card—Republic Cupped and Embossed Roof Bolt Plates! Cupping and embossing increases plate strength so greatly that $\frac{1}{4}$ " Republic Plates can replace $\frac{5}{16}$ " and even $\frac{3}{8}$ " flat plates. Reduction in shipping weight alone can mean important savings for you.

Republic Mine Roof Bolts are made in designs for every type of roof condition. There's one best suited for the strata you are working in... and a Republic Field Service Team will run tests at your mine to help you determine which Republic Bolt will do the best job. No obligation. Write Republic Steel Corporation, Dept. CA-2780, 1441 Republic Building, Cleveland 1, Ohio.

REPUBLIC STEEL

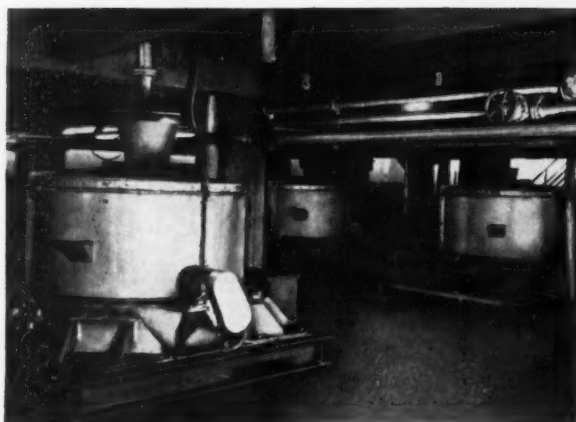
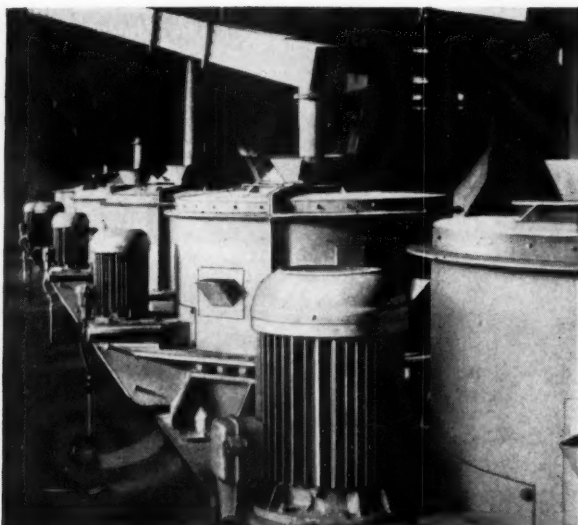
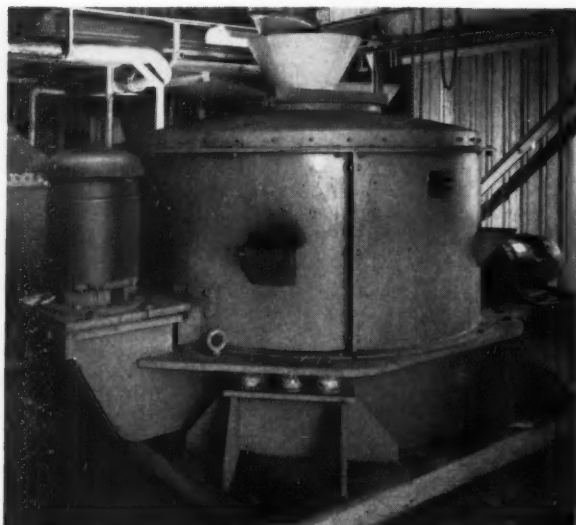


REPUBLIC HAS THE FEEL FOR MODERN STEEL

A

ROOF BOLT PLATE





HUNDREDS OF HUMBOLDTS are saving hundreds of tons of coal — hundreds of dollars — in preparation plants all over the world

Why not profit by the years of successful experience that are back of the Bird-Humboldt Oscillating Screen Centrifuge?

Here are some of the Humboldt's outstanding advantages:

MAXIMUM DRYNESS — on stoker coal, 2-2½% surface moisture; on minus ¾", 4-6%.

MAXIMUM COAL RECOVERY — 98 to 99% plus, throughout the entire life of the screen.

MAXIMUM CAPACITY — up to 100 tons per hour, depending on size of coal and size distribution.

MAXIMUM ECONOMY — screens last 3000 hours or more; power is less than 0.2 KWH per ton; rugged construction assures minimum maintenance.

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This Month in

**COAL
AGE**

September, 1961

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**Modernization****Anthracite in Panther****Valley Stages a Comeback p 56**

A new \$1½ million preparation plant, Greenwood Breaker, is designed to provide fast efficient service to truckers in view of increasing tonnage of anthracite now moving to market over the highways. Outstanding feature of plant is 12x20-ft heavy-media drum separator, the largest in use for cleaning coal.

Source of the raw coal is 750-ft-deep open pits in which the famous Mammoth vein is mined.

Operations are directed by Fauzio brothers, Nesquehoning, Pa.; sales are handled by Lehigh Navigation-Dodson Co. Production capacity is 5,500 tpd, clean coal.

Preparation, Stripping**Two-Stage Air Cleaning Solves****Preparation Problem p 62**

Product consistency and increased coal recovery are major benefits resulting from addition of a two-stage cleaning plant at the Rice Brothers Coal Co., Morann, Pa. Near-gravity material in the raw coal plus moisture

during periods of wet weather are two problems successfully overcome with the plant. Designed and built by Ridge Equipment Co., the plant includes two 48-in Ridge Airjigs for primary cleaning, a 24-in secondary Airjig, rotary breaker, crusher, screens and conveyors. The company produces 1,000 tpd from three strip pits. A truck-mounted Davey vertical unit handles the drilling job. Stripping units include 5-, 6- and 7-yd draglines.

Construction**Shaft Sinking With Chemical****Grout p 72**

New chemical grout solves the problem of sealing porous sandstone in sinking 3,000-ft shafts at large colliery in Scotland. The porous sandstone was encountered at a depth of 2,000 ft and threatened completion of the shafts. Inflow was 144 gpm.

American Cyanamid's AM-9 was injected into the porous stratum. AM-9 is a chemical of low viscosity containing a catalyst which controls its setting time. Gel times can be controlled from 5 sec to a number of hours. Gel strength is determined by concentration of materials used.

The result: Inflow was reduced by approximately 95%, permitting the successful continuation of the work.

(Continued on p 7)

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▲ SERVICE ACCESSIBILITY

... years ahead engineering gives fast, easy access to major components to cut repair and replacement labor time. Compared with a competitive crawler of the same class, the C-6 saves 7 hours on a radiator replacement, 5 hours on a drive sprocket, 6 hours for an engine change, 17 hours on recoil system replacement. Every hour cut from downtime means more productivity and lower operating cost.

▲ PROVEN POWER TRAIN

... every component, the GM 6-71 engine, Allison Torqmatic Drive and Euclid planetary final drive, are job proved for long service life and efficient performance. Parts and service are readily available everywhere.

▲ LOWER ENGINE PARTS COSTS

... individual engine parts ... pistons and rings, liners, connecting rods, etc. ... are lower in cost ... up to 72% less. And a complete engine replacement from fan to flywheel costs only half as much in the C-6!

If you're interested in cutting costs and getting more crawler production, check the Euclid C-6 ... the lowest cost tractor and most versatile, by far! Your dealer has facts and figures and can probably show you a "Euc" crawler at work on a nearby job.



EUCLID

DIVISION OF GENERAL MOTORS, HUDSON, OHIO
Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland

THIS MONTH IN COAL AGE (Continued)

Plant Maintenance

Preventive Maintenance

Eliminates Costly Delays p 76

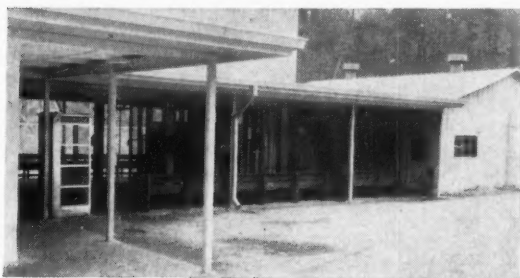
Scheduled maintenance, application of special long-lived materials and accurate maintenance records provide the foundation for 24-hr operation without costly delays at U. S. Steel's Maple Creek and Robena preparation plants. The basic principles of the Robena program are systematic inspection, an accurate card record of all plant motors, scheduled electrical maintenance and operating-time records for each unit. The Maple Creek plant program includes use of wear- and abrasion-resistant material wherever possible, spare units or motors, hour meters for equipment subjected to severe wear and ammeters for all major units.

Taxes

Development Expense p 82

"Development expense" is a broad term covering (1) expenditures for development prior to production, (2) ordinary expenditures to keep the mine operating at capacity, and (3) extraordinary expenses after the production stage is reached to increase output, improve the mine or open up additional mineral reserves. Much of the difficulty usually experienced in determining the income-tax consequences of development expenses can be avoided by a thorough understanding of the different meanings of the term and by an accurate classification of the particular expenditure in question.

For Specific Situations—Seventeen cases covering the major development-expense situations.



Services

New Portal Boosts Output 10%,

Improves Ventilation p 94

A \$300,000 investment in new portal facilities made it possible to add a full hour of productive time and boost output 10% at the Mulga mine, Woodward Iron Co., Mulga, Ala. From the time the men leave their cars in the paved parking lot until they enter the man-trip cars underground, they move along a one-way route without meeting workers from other shifts going the opposite direction. Workers descend 215 ft vertically in the new shaft in a 40-man two gate push-button elevator traveling at a top speed of 140 fpm. The planned movement of men not only eliminates congestion but also makes it possible to change shifts in 15 min.

This Month

in **COAL**

SAME PATTERN?—Though there is a possibility of a significant change in the remaining months of 1961, developments in bituminous production so far in the last half indicate a pattern not too different from the last half of 1960. If that proves to be the situation, the output for the last half would aggregate some 200 million and the total for the year would be 385 to 390 million. It will take a sharp pickup in the demand rate, meaning primarily that steel takings will have to increase considerably, to raise these totals appreciably.

In anthracite, the pattern so far in the last half has been output slightly under that in the corresponding weeks in 1960. A cold fall and early winter could bring the rate up appreciably.

BERLIN BUILDUP?—Is there likely to be any considerable upping of the business level, and in turn coal consumption, as a result of the step-up in military preparedness growing out of the Berlin situation—and out of increased aid to try to keep foreign nations on our side? There seems little indication that the buildup will have any appreciable impact on the economy. The government budget already is so large that it takes a big raise to register. Also, even when new contracts are let it takes some time for them to be reflected in actual construction.

FASTER THAN USUAL?—The recent announcement of the attainment of a coal rate of 8,975 Btu per kwhr over a full year of operation at a major new power plant focuses attention on the present and possible future effects of efficiency on coal demand—not only in making electricity but in making steel and general industrial use. Since major breakthroughs are seldom made, increased utilization efficiency normally is a gradual thing. However, it may be that it has speeded up somewhat recently, thus accentuating the effects of the depression, though direct losses to competition still hurt the most.

NO COALS TO NEWCASTLE—Politics continues to play its considerable part in coal-export picture. A prime example was the German tax on shipments over a certain level a few years ago. A more-recent one is the action of the British Board of Trade in barring a steel company from buying metallurgical coal in the U.S. And politics are a factor in Japan's plans to purchase from other countries than the U.S., including communist China. But so far an additional Canadian steel firm, newly an importer from the U.S., plans to continue this practice, though the political pressure is considerable. The company is resisting this pressure because of definite economic benefits.

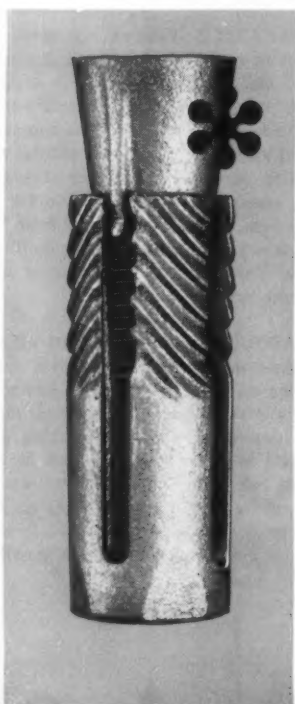
CHAR, GAS AND GASOLINE—Announcements of additional char and chemical-coke plants, as well as a spate of papers and publications on the economic and technical possibilities of synthetic gasoline and gas from coal, indicate that an increasing number of people are taking another look at the prospects in these directions and, in the case of char and chemical coke, are actually laying money on the line for producing facilities. It would not be too surprising to see, in the next year or two, announcements of pilot plants for oil and gas production—quite possibly by oil and gas interests.

O-B Designs For Mining Men



RESULT:

A 4-way expansion unit that holds in soft shale or hard rock



4-WAY EXPANSION UNIT BUILDS HOLDING POWER FAST . . . because the flexible fingers of the shell are slightly pre-expanded to grip the wall even before wrenching begins.

GOES UP FAST AND STAYS PUT. When the bolt is shoved up the hole, the expansion unit holds the bolt in place until it's tightened . . . no need to have hands exposed to injury during wrenching.

GREATER STRENGTH IN HARD TOP . . . BETTER "PURCHASE" IN YIELDING TOP . . . because the expansion pressures are spread evenly over the four shell fingers to make the best use of the entire unit's strength. These are the reasons for the O-B Expansion Unit's popularity with mining men. It is easy to understand why more mine roof is supported with O-B Shells and Plugs than with any other kind.

For further information and prices, see your local O-B sales-engineer or write us now. OHIO BRASS COMPANY, MANSFIELD, OHIO. Canadian Ohio Brass Company, Ltd., Niagara Falls, Ontario.

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EXPANSION SHELLS AND PLUGS • LINE MATERIALS • SAFETY
AND CONTROL EQUIPMENT • ELECTRIC HAULAGE MATERIALS

10048-M

Coal Preparation

Simplicity Marks New Benham

Plant p 98

New 400-tph cleaning plant receives coal from two eastern Kentucky seams and produces a clean blend for metallurgical use. Built by Link-Belt for Wisconsin Steel Co., Div. of International Harvester Co., the facilities include coarse- and fine-coal preparation circuits and a water-clarification system.

The 5x4-in fraction is cleaned in an air-pulsated washbox, including middlings-recovery circuit. The 1/4x0 is thickened in 24-in cyclones and cleaned on wet tables.

Flocculation in a 70-ft thickener is a major step in water clarification. Clear overflow of the thickener is reused and thickened solids are filtered prior to disposal. Filtrate is returned to recirculating-water system.

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THIS MONTH . . . in Mining Practice

NOW COMMERCIAL—Perhaps the testing and development period still cannot be considered over, but hydraulic mining now is a commercial fact. The application is in pitching coal and the pioneer is Coal Inc., at Ravensdale, Wash. A second experimental but full-commercial operation also is planned by the Coal Dept. of the Northern Pacific Ry. for Washington beginning this fall. It will recover pillars on a 40-deg pitch. Since pitching coal rules out practically all conventional forms of mechanical production, these two ventures could mark hydraulic mining's acceptance as a standard method of attack.

ALUMINUM SPURT—Production of 125 aluminum mine cars for one major coal property, and of a sizeable number of aluminum roof beams (for use with jacks) for another, are further signs that this light metal will be seen more and more frequently in mine service. The beams, incidentally, will be curved and otherwise shaped to fit the opening left by a boring-type miner. Weight saving is of course a big advantage in both instances. In the case of the mine car it is 40% or better. In Canada, experience with aluminum cars goes back to 1947.

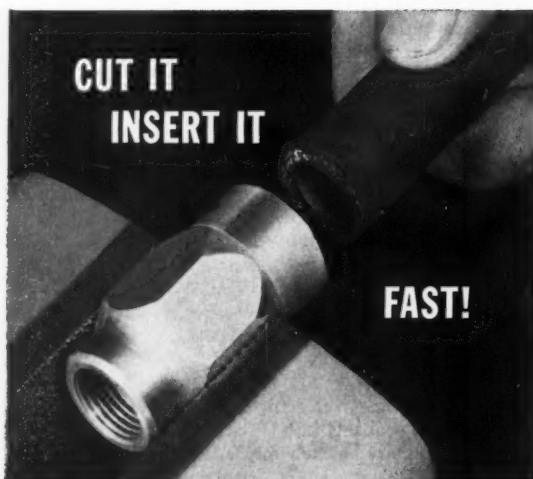
INTEREST ITEMS—According to what readers tell COAL AGE about the products they discuss with their superiors, two things are more on their minds than any others. They are, first, bits, followed closely—very closely—by roof bolts. Not far behind are lubricants and hydraulic fluids, and close behind again are belts, loaders and cables. Mining as we know it today would of course be impossible without bits, which accounts for the emphasis. And also roof support is always with the underground miner, as is equipment lubrication and—in recent years—operation and maintenance of hydraulic components. And where the emphasis is is where additional major progress can be expected.

TIRES AND WHEELS—Though it will be a while yet before there is much usage, the trucks of the future are likely to be sporting at least two new running-gear items—the electric wheel and single-dual tires. Electric-wheel developments are being marked by a growing contest between DC and AC units. The winner still is a matter for the future. Like the electric wheel, the single-dual tire, to be made available shortly for replacement of most of the sizes employed today, reduces weight and especially unsprung weight. Other claims are better brake cooling, easier brake maintenance and less risk of fire following a flat. Beyond these, complete redesign of haulage units is envisioned with ensuing improvements all along the line.

MORE THIRD-SHIFTING—The added difficulty of maintenance has been one reason for the relatively low volume of third-shifting in coal mining. This difficulty is especially noticeable where spare units cannot be brought in, as in the case of a preparation plant. But the prices of plants and equipment are such today that three-shift-operation would result in a significant saving in machine and plant costs per ton. For this and other reasons, and though it will require a revised maintenance approach, third-shifting will grow.

Save Hose Replacement Dollars .

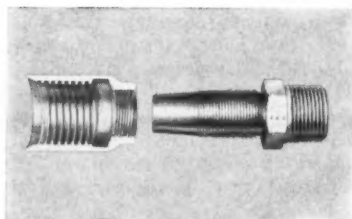
Using PARKER Fittings with PARKER Hose to make Replacement Assemblies Faster



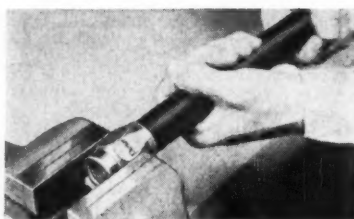
Installing Parker "Hoze-lok"® Fittings on Parker "No-Skive" Hose . . . NO SKIVING!



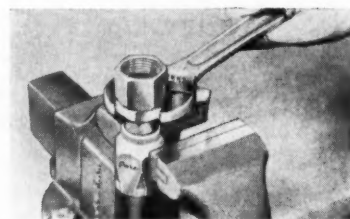
Installing ordinary fittings on ordinary rubber-covered hose . . . First, this messy skiving job.



Design of the "Hoze-lok" socket (left) makes the difference. The deep-tapped threads accept the **controlled thickness** rubber cover of Parker "No-Skive" Hose as they plow their way down to the wire braid of the hose. The rubber is displaced, not removed.



Just screw the hose in counter-clockwise, by hand. The rubber cover fills completely the space between each thread. It both protects and cushions the wire braid, eliminating a major cause of hose failure. A little Parker "Threadlube" is needed here.



The nipple, which is also the hose end fitting, screws in last, clockwise, in the usual way. You are now ready to make up the other end of your Parker No-Skive Hose Assembly. This method is not only faster; it gives you a better assembly. See next page.

You can install a Parker "Hoze-lok" Fitting on small-diameter Parker "No-Skive" Hose in 60 seconds. On 3/4" Parker hose, it takes 2 minutes or less. On very large sizes, allow 5 minutes per fitting. Hose replacement time is reduced to minutes the Parker No-Skive Way!

.. the Parker No-Skive Way

Why Parker No-Skive Hose Assemblies Last Longer



BETTER PROTECTION FOR THE HOSE AT ITS POINT OF GREATEST STRESS

Most hose failures result from flexing. Ordinary hose, skived to the bare wire at the critical point where the first thread of the hose fitting bears directly on the wire braid, fails right there. As our picture shows, the leading thread of Parker "Hoze-lok" Fittings cannot reach the wire. The cushioning effect of the compressed rubber between the threads reduces the stress concentration at this point. Gripping by direct contact between the deep-tapped "Hoze-lok" threads and the wire braid occurs well within the fitting, where no flexing occurs.

Actual tests prove the effectiveness of this better design feature. Parker "Hoze-lok" assemblies on Parker "No-Skive" Hose rarely fail at the fitting, even when stressed to the burst point.

HOW PARKER DEVELOPED A BETTER HOSE TO MAKE THESE SAVINGS POSSIBLE

Parker "Hoze-lok" Fittings can be used with any hose, but you still have to skive ordinary rubber-covered hose, even with "Hoze-lok" fittings. Parker "No-Skive" Hose, however, is made to rigid specifications that limit and control the thickness of the cover to the exact amount of rubber that the corresponding size of "Hoze-lok" fitting will accept, when attached without skiving.

In all other characteristics, from the inner liner to the OD of the outermost wire braid, Parker "No-Skive" Hose conforms to S.A.E. specifications. In addition, because only a better grade of rubber compound can be extruded to Parker's exacting controlled thickness specification, the increased resistance to abrasion of the Parker "No-Skive" rubber cover results in a better hose.



Parker FITTINGS AND HOSE DIVISION

17325 Euclid Avenue • Cleveland 12, Ohio

PNEUMATIC AND HYDRAULIC SYSTEM COMPONENTS

**ARRANGE NOW
FOR A
PARKER NO-SKIVE
DEMONSTRATION
IN
YOUR OWN
PLANT OR OFFICE**

Gentlemen: We would like to see the Parker No-Skive Way to make up replacement hose assemblies demonstrated, without any obligation on our part, of course.

Please ask your salesman or nearest "Hoze-lok" distributor to get in touch with me:

Name _____

Title, Department or Division _____

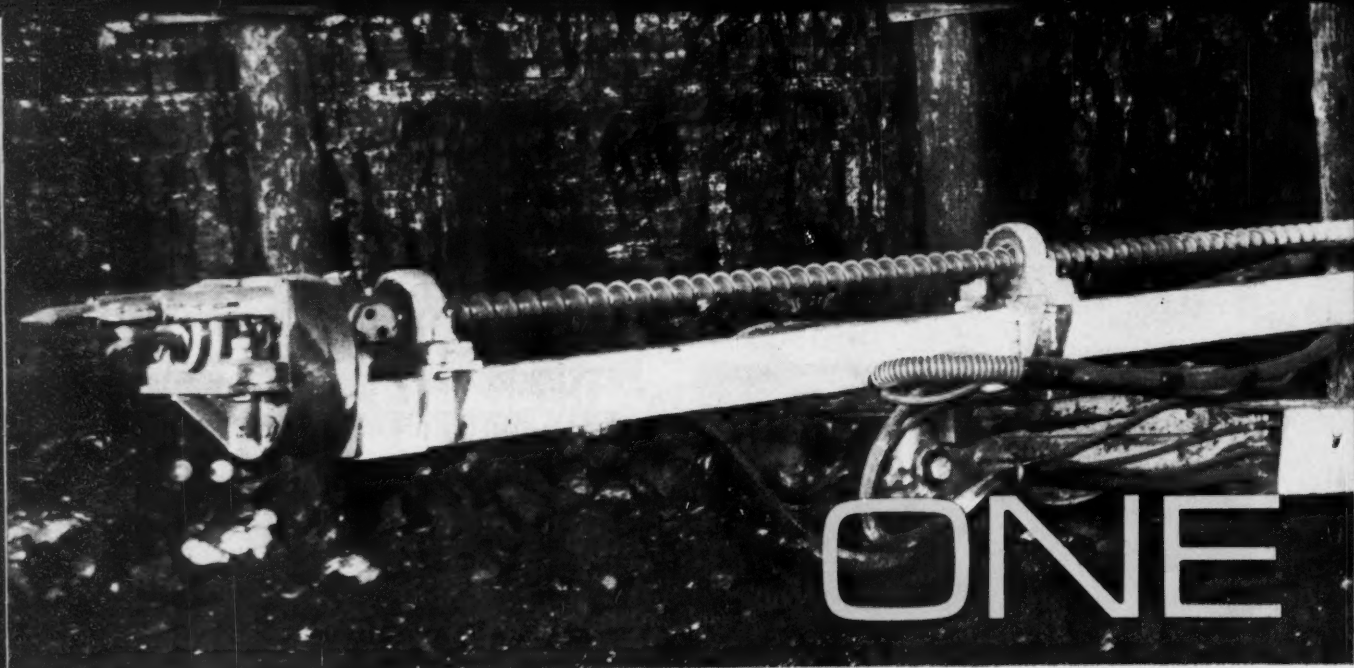
Company _____

Address _____

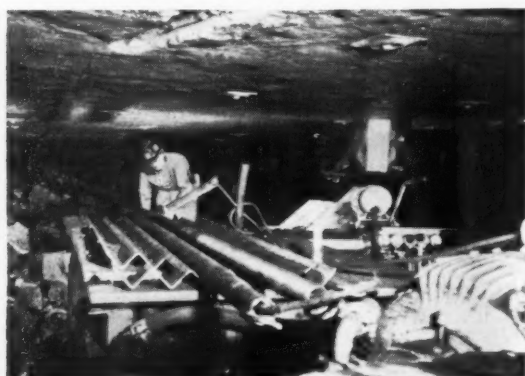
City _____ Zone _____ State _____

We use hose for _____

3079-PH



Single unit drilling, multiple shooting machine



This is a "standard" cycle established in a West Virginia coal mine.

Tramming (200 feet average)	2.00 minutes
Drilling	4.10 minutes
Loading Holes with Airdox Tubes	2.00 minutes
Walk to Blowdown Valve and Return	1.32 minutes
Shooting	1.50 minutes
Removing Tubes From Holes, Loading on Machine	2.00 minutes
Total	12.92 minutes

The Long-Airdox mobile drilling and multiple shooting machine makes it possible for *one man* to drill and shoot the face quickly and economically.

It is equipped with racks for carrying tubes, high



LATER

offers fast cycle for high capacity mining systems

pressure hose, and sequence valves. Operator drills holes, inserts tubes, and shoots them in proper sequence in a single operation.

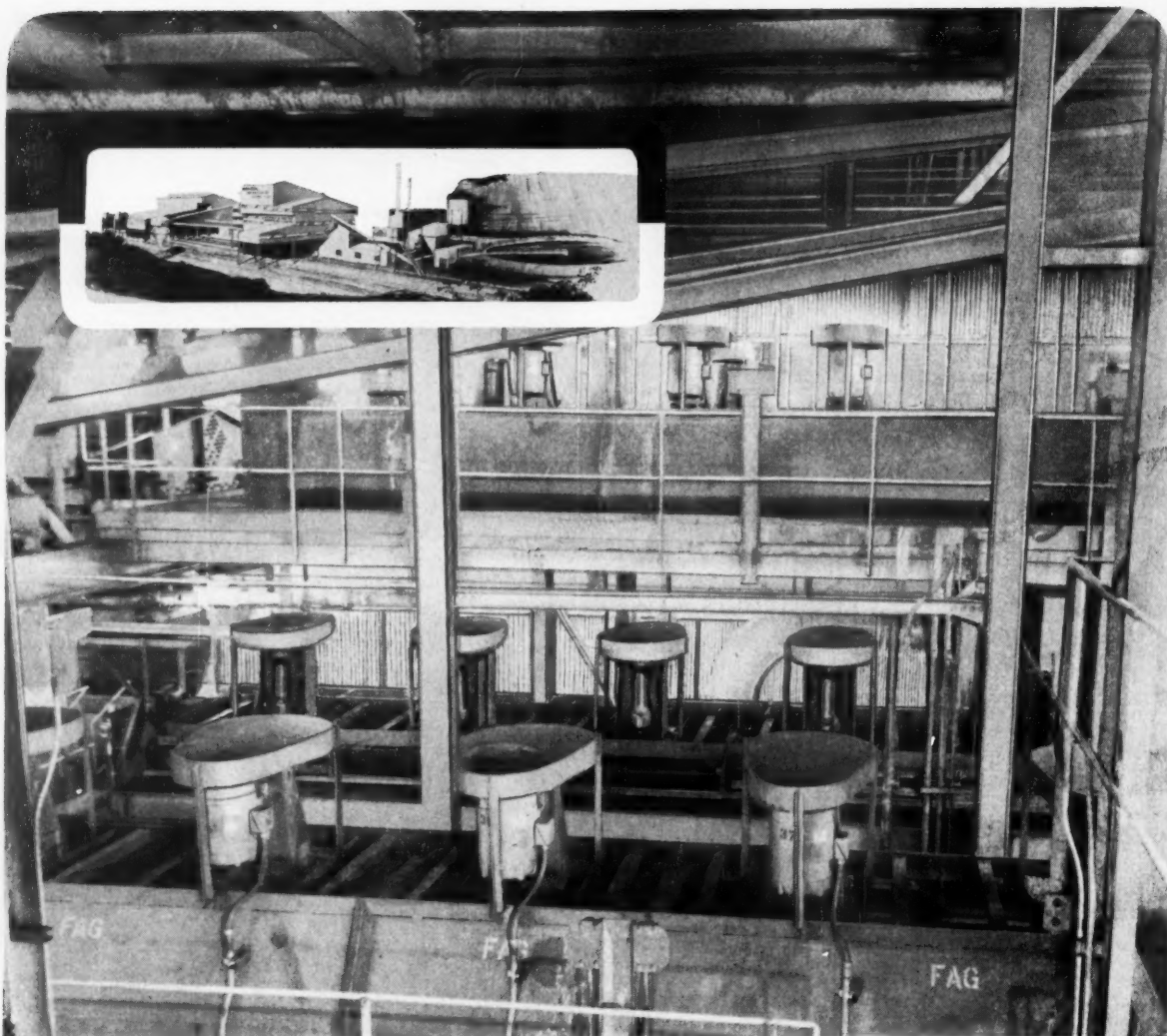
New Long-Airdox developments—the mobile coal drilling and multiple shooting machine, lighter weight automatic discharge tubes, sequence shooting of any number of holes, and others—force revision of former ideas concerning air shooting. Long-Airdox Mobile Multiple Shooting also gives you these plus benefits.

- Faster cycles—no waiting for smoke to clear.
- Better loadability—coal is heaved outward for easier, faster loading.

- Full undercut depth realized—square faces and ribs—more coal per cut.
- Especially suited to deeper cuts.
- Low cost—based on clean coal only.
- Better sizing for higher realization and less expensive cleaning.
- Coal has firmer structure—better size stability on the way to market.
- Safety.

For complete details on Mobile Multiple Shooting, and for information on drilling machines for all applications, write Long-Airdox, Oak Hill, West Virginia.

LONG-AIRDOX



Wemco-Fagergren Flotation: Making the most of clean coal recovery at new Imperial No. 2 Preparation Plant.

Imperial No. 2 Preparation Plant, new coal processing facilities engineered and constructed by Roberts and Schaefer Co., is another big step forward by Imperial Smokeless Coal Company. Purpose of the new plant is to upgrade coal mined from the Sewel Seam in south eastern Nicholas County, near Quinwood, West Virginia. Incorporation of the most up-to-date coal processing equipment and techniques available in this plant is typical of Imperial's progressive thinking—and action—for the future.

Primary emphasis has been placed on advanced design, coordination of all operating phases, selection of the finest equipment of proved capability. Significant, then, is the use of twenty-two

Wemcoal Fagergren flotation cells, twelve for roughing duty and ten for final cleaning of rougher concentrate. These cells, chosen on the basis of Wemco's industry-proved performance, plus cost-saving factors, have played a prime part in one of the industry's most advanced coal upgrading plants.

Imperial Smokeless Coal Company. Another example of how leading companies of the industry look to Wemco for the standard in low-cost dependable flotation performance.

Contact a Wemco representative or write today. We'll gladly send details on Wemco's extensive coal experience and ability to answer the most complex needs.

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DI 2-8540

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WEMCO®

a division of

Western Machinery Company

650 Fifth Street, San Francisco 7, California

HAZARD WIRE ROPE



Edw. C. Levy Co., multi-million ton aggregate producer, switches to VHS exclusively!

DETROIT, MICHIGAN—Pat Livingston, Levy Equipment Manager, says: "We use LAY-SET VHS on 36 pieces of equipment operating at 7 different locations. Since many of these machines work 'round the clock, we've had plenty of opportunity to compare one brand of wire rope with another. VHS has beat them all. Everywhere we've used it...on drag lines, shovels, dozers...VHS has saved us money by reducing equipment downtime."

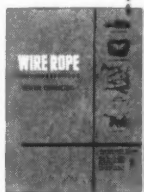
Like Pat Livingston, you, too, can cut costs by using VHS for the extra-rugged jobs that "tear up" other brands of wire rope. VHS,

which stands for Very High Strength, is an entirely new grade of wire rope that is 15% stronger than Improved Plow Steel. It's also tougher and more resistant to abrasion than IPS. In short, LAY-SET VHS has exactly what you're looking for in a wire rope—the reserve strength to give more service with less equipment downtime for rope replacement.

♦ ♦ ♦
Ask your Hazard Wire Rope distributor for LAY-SET VHS. He can give you immediate delivery of the size and construction you need.

Mail Coupon for FREE Wire Rope Recommendation Booklet

**Hazard Wire Rope Division
American Chain & Cable Company, Inc.
WILKES-BARRE, PA.**

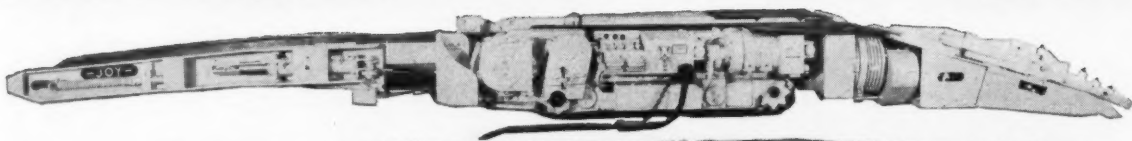
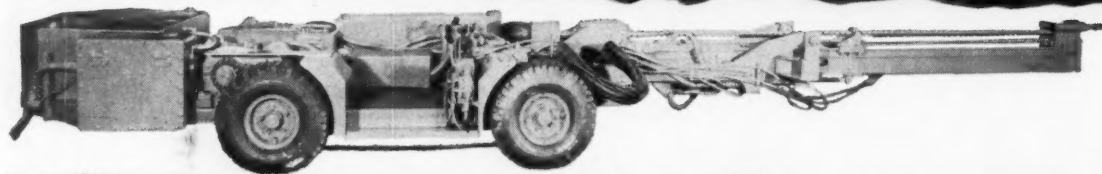


Please send me the **FREE** Hazard Wire Rope Recommendation Booklet listing the right diameter, construction, lay and grade of wire rope to use for over 50 general contracting jobs.

Name _____
Company _____
Address _____
City _____ Zone _____ State _____ CA

ACCO



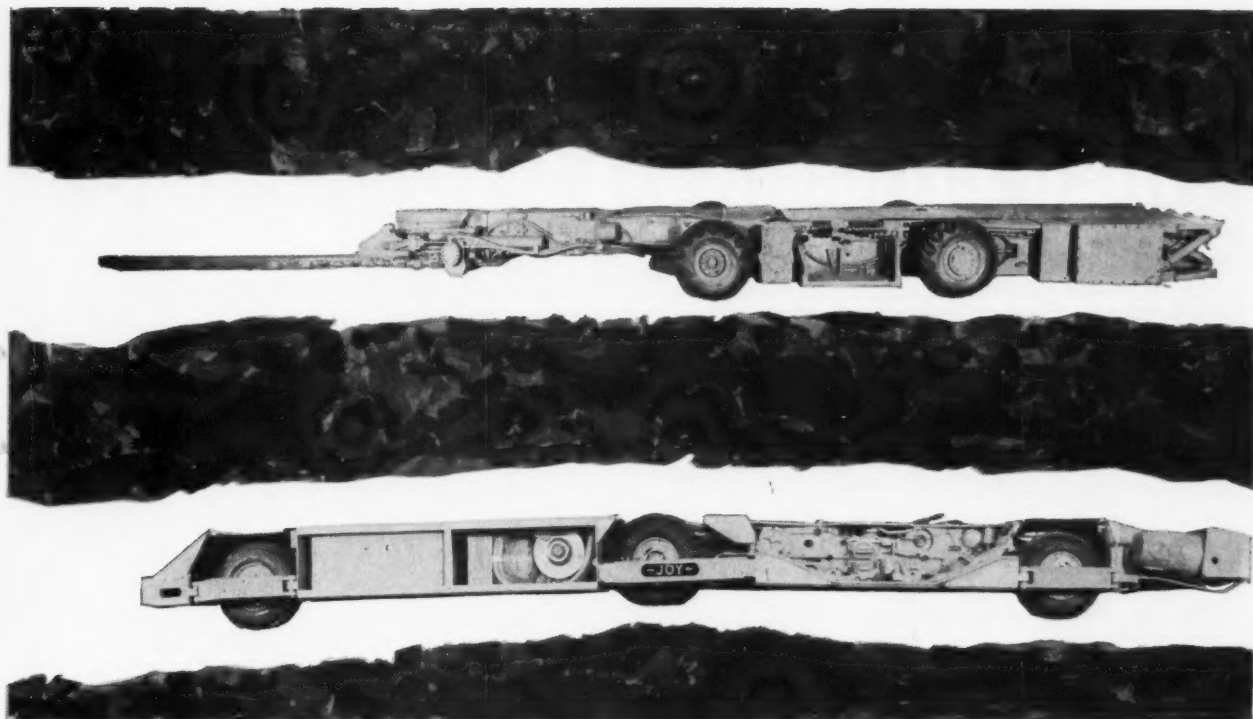


DRILL-CUT-

in seams as low as twenty-eight inches

This new Joy team of conventional mining machines brings high coal capacity to the low seam operator. The CD-61 Drill is available in two models. The 24" machine drills horizontal holes from the roof to 20½" from bottom. The 28" model drills from the roof to 24½" above bottom. On both machines the boom swivels a full 185° so that the operator can tram parallel to the face and also work in tight places. An optional roof and floor jack holds the tail steady for faster cutting.

The 16-RB is the newest Joy cutter. Fixed for bottom cutting or top cutting, the machine is only 24" high, yet has all the heavy-duty features that have made Joy cutters famous. The 11' cutter bar can cut from 6" below the floor to 14" above.



LOAD-HAUL

... with Joy's all new low seam team

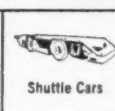
The 14BU-10 Loader is also 24" high, yet has a high seam capacity of 10 to 12 tons per minute. The conveyor pan is only 14" above the floor to permit the loading of large lumps in 28" coal. The unit has a 30" wide conveyor.

Haulage is supplied by the famous six-wheeled 18-SC shuttle car in a new 24" version. The "hinged-in-the-middle" construction gives it 125 cu ft capacity and a smoother ride for working low seams at high speed without danger of bumping the roof.

This all new lineup of equipment brings low seam operators the advantages of high production equipment for the very first time. To get that all important competitive edge in low seam coal, get all the details from your Joy representative or write for Bulletin 3447-1.



**WORLD'S LARGEST MANUFACTURER OF
UNDERGROUND MINING MACHINERY**



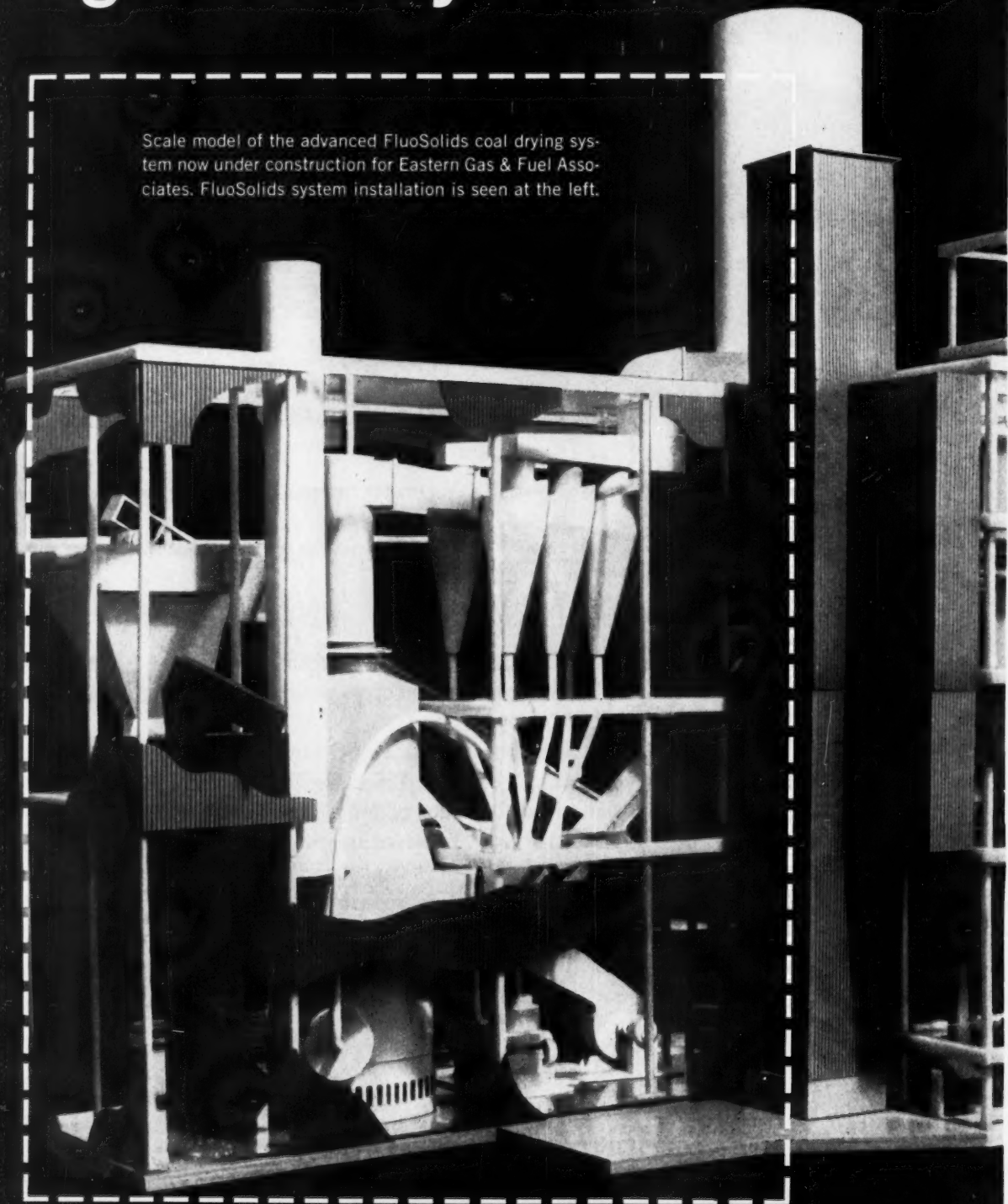
JOY

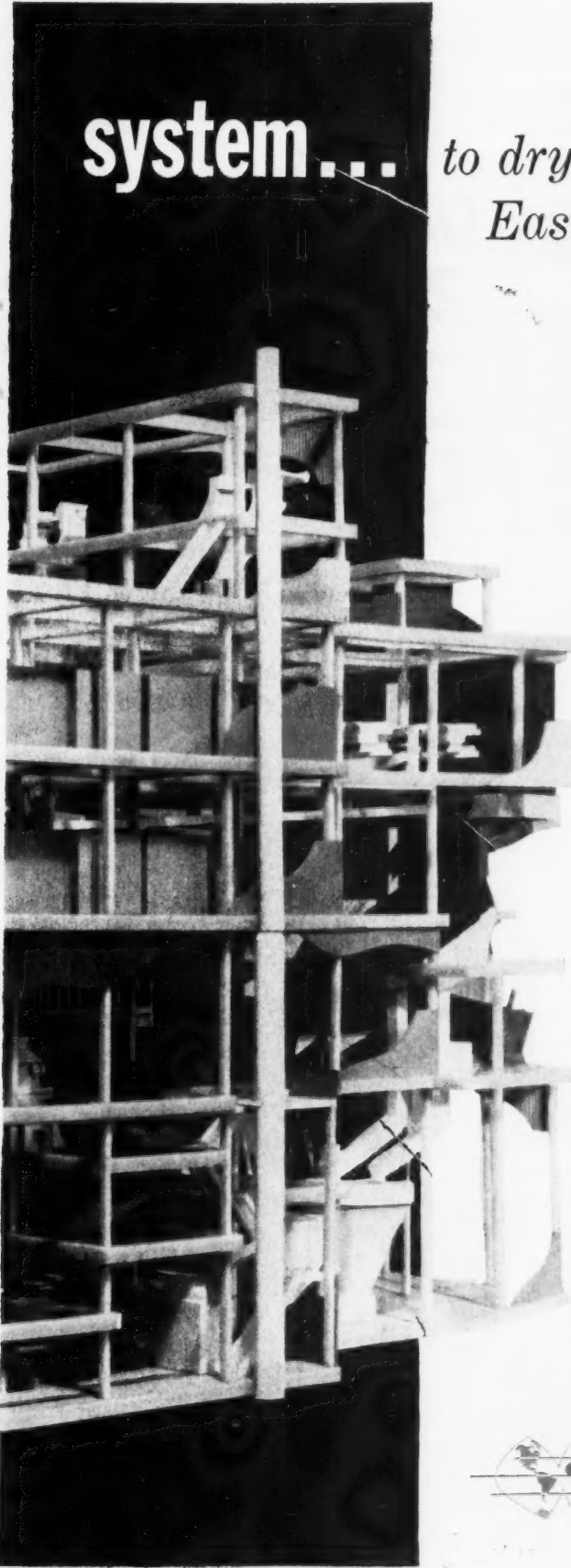
Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company
(Canada) Limited, Galt, Ontario

High efficiency FluoSolids[®]

Scale model of the advanced FluoSolids coal drying system now under construction for Eastern Gas & Fuel Associates. FluoSolids system installation is seen at the left.





system... to dry coal for *Eastern Gas & Fuel Associates at Federal No. 1 mine*

Designed to remove up to 33 tph of water, a Dorrico® FluoSolids system now under construction for Eastern Gas & Fuel Associates, at Grant Town, W. Va., soon will rank as one of the most significant coal drying installations in the East.

With start-up projected for late 1961, the new unit will process 465 wet tph of $\frac{3}{4}$ " x 0 coal, evaporating 33 tph of water.

Since its introduction in 1954 the Dorrico FluoSolids coal dryer has established unrivalled standards of efficiency and economy... wherever it has been installed. The hard-fact reasons why are these—

The FluoSolids dryer conserves space... because it is of compact, unitized design. It provides rapid start-ups and shut-downs... it burns pulverized coal, today's most accepted means for efficient fuel utilization.

The FluoSolids system saves fuel... none is consumed during shut-down. The system adjusts quickly to variations in feed conditions... because feed rate is controlled instrumentally and automatically.

Uniform fluid bed temperature, varies no more than 5 degrees F., with no localized hot spots. Because of the inherent characteristics of a *true* fluid bed obtained only in a Dorrr-Oliver FluoSolids reactor, drying is uniform, resulting in a product which will meet specified requirements.

The controlled humidity exit conditions in the FluoSolids reactor promotes high cyclone collection efficiency and eliminates dusting conditions due to over-dried fines. Result—a white stack.

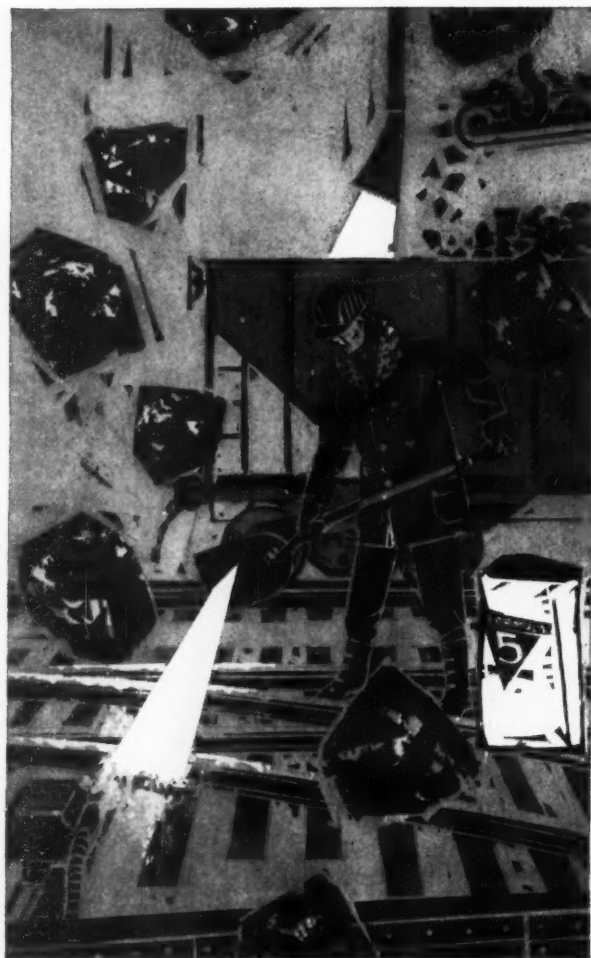
Power costs are lower... since the FluoSolids dryer operates with lower air volume than any other system. Feed size can range from filter cake on up to a top size of $1\frac{1}{2}$ " coal. And the FluoSolids dryer handles small tonnages as readily as feed rates up to 800 tph.

Your coal preparation facility will be more efficient and more economical with a Dorrrco FluoSolids coal drying system... engineered for your facility.

For complete information on today's most advanced coal dryer write Dorrr-Oliver Incorporated, Stamford, Connecticut.



DORR-OLIVER
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KEEP COAL FREE-RUNNING

...TRACKS, SWITCHES AND WALKS ICE-FREE...WITH MORTON "FORMULA 5" CONTAINING RUST INHIBITOR

"Formula 5," unlike plain rock salt or simple salt/chemical mixtures, has a combination of rust inhibitors added to prevent corrosion of cars, motors, conveyors and other equipment. It is treated to control its dissolving rate and to prevent its caking during shipping and storage. It won't cause costly delays by lumping or caking in feeders.

"Formula 5," with a new, easily distinguishable blue color, is specially made to meet the requirements of coal producers. A free-flowing product, it is composed of chemically treated sodium chloride (30-70 mesh) and a special new improved combination of anti-corrosive compounds.

Morton "Formula 5" is the safest, most effective freezeproofing compound you can buy. Even at sub-zero weather it keeps coal free-running, and serves as an ideal de-icer wherever freezing presents a problem.



Write for free booklet, "The Key to Low Cost Effective Freezeproofing." If you would also like a Morton representative to assist you with freezeproofing and equipment maintenance problems without cost or obligation, write:

MORTON SALT COMPANY

Industrial Division, Dept. CA9, 110 N. Wacker Drive, Chicago 6, Ill.



See our exhibit at the 2nd West Virginia Mining and Industrial Show

Charleston Civic Center

Sept. 19, 20, 21, 1961

REPEAT ORDER!

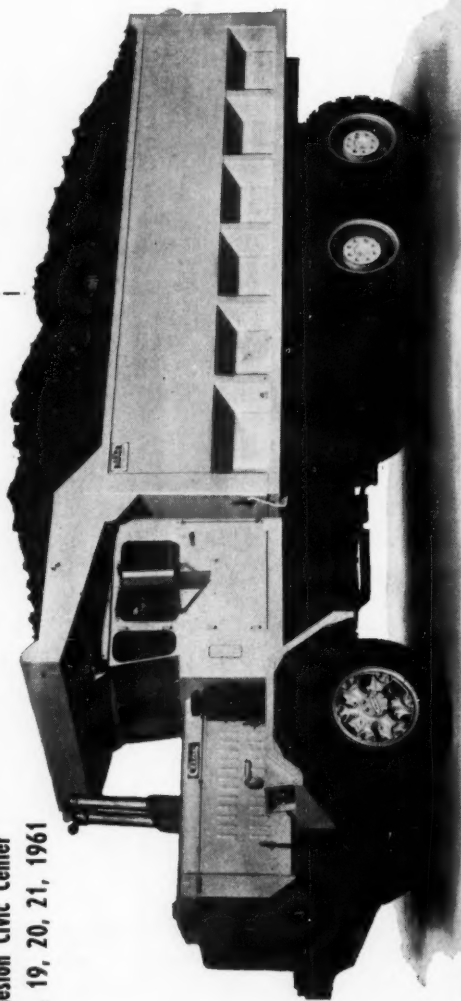
From a West Virginia Strip Mine

CLINE

TD-904

30 Cubic Yard Truck
72,000# Planetary Rear Axle
18,000# Front Axle
350 H.P. Cummins V-8 Engine
15-Speed Transmission
13 x 25 Tubeless Tires on All Wheels

Thompson Hydraulic Retarder
Brake Optional



CLINE TRUCK MANUFACTURING CO.

3501 GARDNER AVENUE

KANSAS CITY 20, MISSOURI

The Importance of **Balanced Compounding** in Portable Cable Design

A portable cable is constantly under attack from many different directions. It is dragged over rough floor surfaces and rocky terrain, crushed under the wheels of trucks and carts, continually bent, flexed and stretched. In addition, it is very often subjected to attack by water, solvents, oil and ozone.

To give long, dependable service, portable cables must be able to withstand rough treatment, and must have built-in protection against all deteriorating factors. Moreover, they must possess other desirable qualities such as lightness and flexibility.

The science in designing these cables is to add the necessary ingredients in the jacket to provide maximum protection along with the maximum of other desirable features. This is where *Balanced Compounding* comes in. It is very easy to provide protection against one or two of the deteriorating factors, simply by loading the compound with an ingredient which is impervious or highly resistant to these factors. Unfortunately, however, the ingredients which provide resistance to abrasion or crushing may be highly susceptible to attack by oil or water; and vice versa.

The cable designer's problem, then, is to attain a balance in his compounding formula which will provide maximum protection against one deteriorating factor without reducing protection against others below the danger point.



To the buyer of cables, this means that *quantity* of any one ingredient is unimportant, unless it is considered in relation to the over-all ability of the cable jacket to resist *all* of the abuses to which it is subjected.


For balanced resistance to all these abuses, the best assurance you can get lies in the quality of the research and development facilities of the manufacturer, and the product's record of performance.

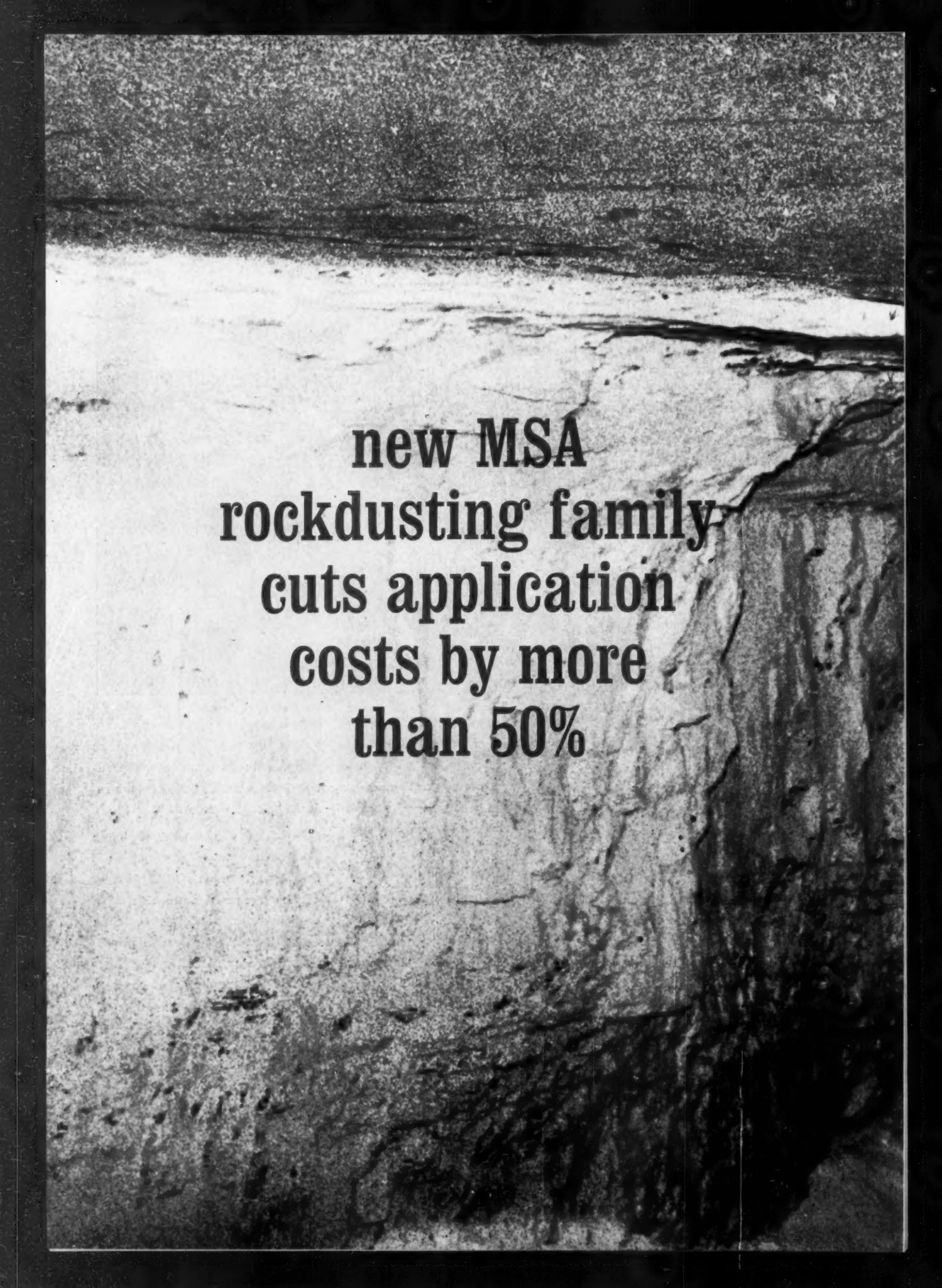
This is one reason why — in those

industries where portable cables are continually used or purchased as components of a manufactured product — Simplex Tirez Cables are regarded as the standard.

Proof of the worth of Tirez *Balanced Compounding*, which gives balanced resistance to all the deteriorating factors of normal use, can be found in the fact that Tirez cables have been successfully performing under the most rugged operating conditions for periods ranging up to twenty years.




Simplex
WIRE & CABLE CO.
Cambridge, Mass. • Portsmouth, N. H.



**new MSA
rockdusting family
cuts application
costs by more
than 50%**

Now you can drastically reduce rockdusting costs because MSA has developed a complete new line of equipment for handling large quantities of rockdust—in bulk—from quarry to mine section.

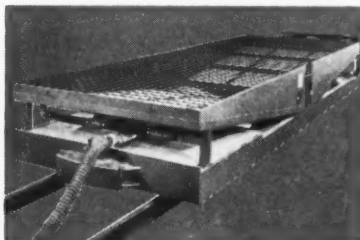
Key factor in this major breakthrough is the AIRSLIDE® principle. M-S-A® AIRSLIDE Rockdust Distributors *fluidize* the dust so that it will flow down a 6° incline. This permits hopper capacities up to 17 tons. In addition, discharge rates are as much as five times faster than conventional models. And less manpower is required to operate them.

Now you can move rockdust in

bulk from supply yard to mine section. Apply it to ribs, roof and bottom. No matter what phase of the operation you're talking about, there's a machine in the new "family" to do the job. Complete flexibility is the design keynote. Principle of operation is the same in all units. But specifications can be varied to match your particular requirements.

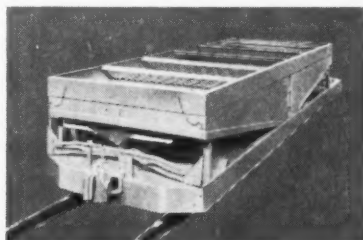
For more information on how the new MSA Rockdusting Family can change the entire cost picture of your dusting operation, contact the MSA Representative in your area. Or write for detailed bulletins.

®Trademark of Fuller Company



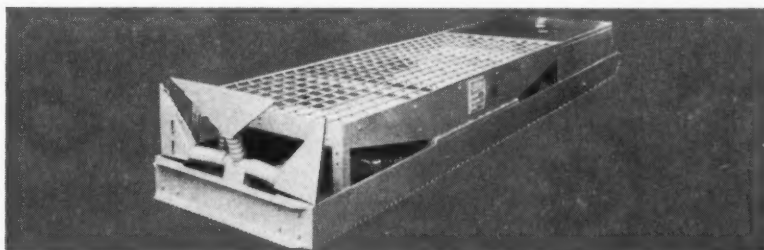
M-S-A® Type S AIRSLIDE Rockdust Distributor A sixteen ton capacity model—operated by two men—using 500 feet of hose applies rockdust to 5350 lineal feet of back entry 2.3 times faster than conventional track mounted high pressure machines.

Savings per load: \$24.26



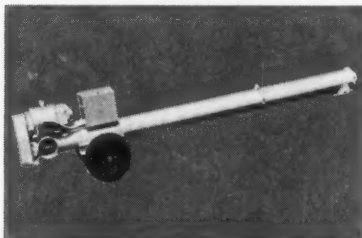
M-S-A® Entry AIRSLIDE Rockdust Distributor A sixteen ton capacity model—operated by one man—discharges dust at 600 pounds per minute. Applies rockdust to 5350 lineal feet of track entry 10.2 times faster than conventional track mounted high pressure machines.

Savings per load: \$28.63



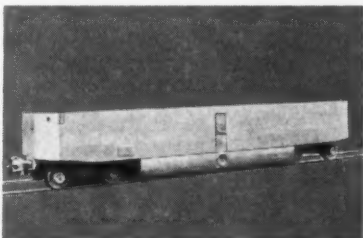
M-S-A® Type SC AIRSLIDE Rockdust Distributor A two ton capacity skid or rubber tire model—operated by one man—discharges dust at 600 pounds per minute. Applies 16 tons of rockdust to a section 12.9 times faster than conventional machines operated by three men.

Savings per load: \$112.44



M-S-A® Transfer Conveyor Transfers rockdust from supply car to rockduster at one ton per minute. Empties car 20.4 times faster than unloading equal weight of bagged rockdust by hand method.

Savings per load: \$18.08



M-S-A® Bulk Supply Car Receives up to 16 tons of rockdust delivered in bulk direct from quarry to supply yard. Then transports entire load of rockdust from supply yard to mine section.

Savings per load: \$61.60

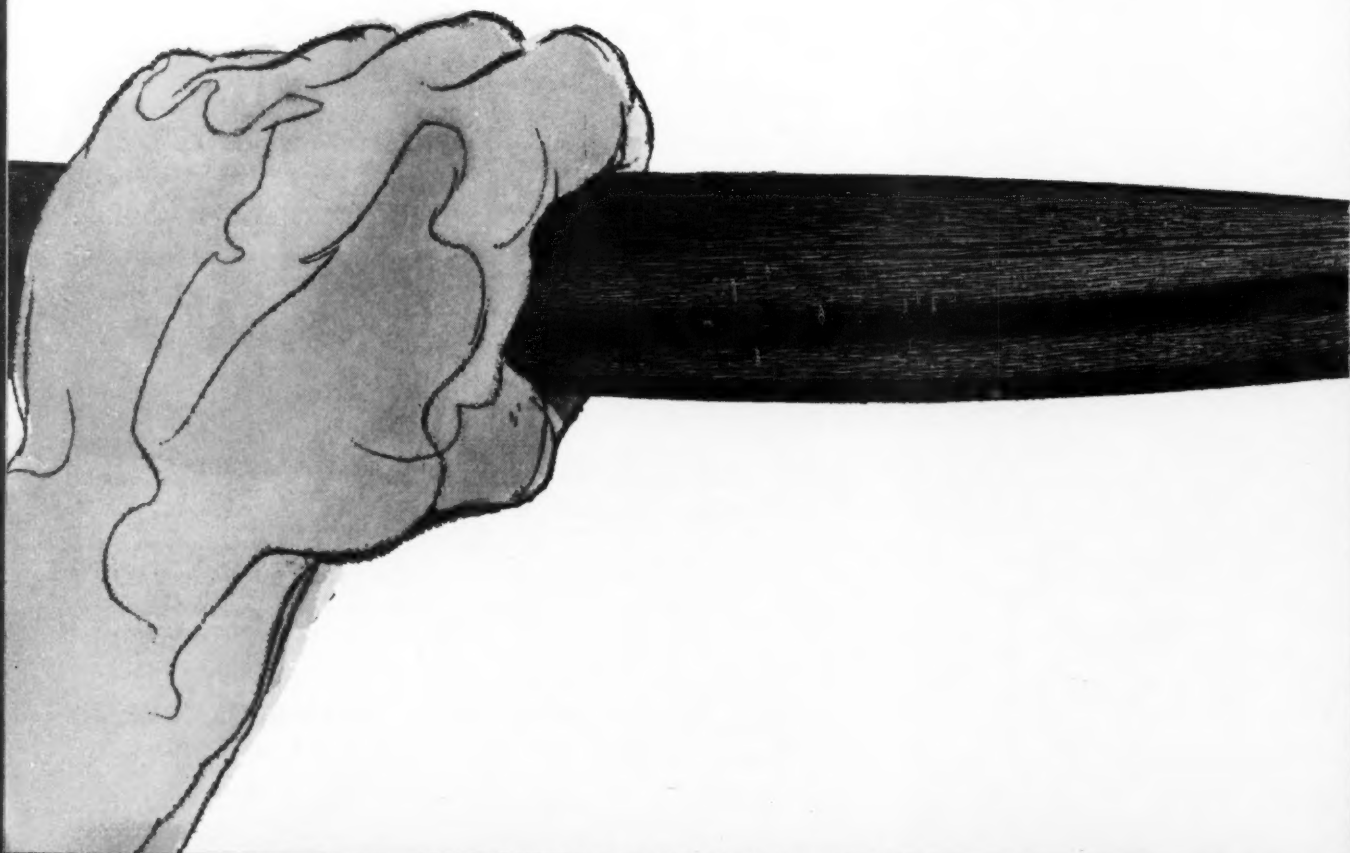
Note: All savings figures used in the above are taken from time studies made by MSA Engineers under actual operating conditions.



MINE SAFETY APPLIANCES COMPANY
Pittsburgh 8, Pennsylvania

**Ever hear of Dynamic
Balancing? It's what makes
USS Amerclad outwear other
mining machine cable**

Uneven tension and elongation are death to electrical cable. No other single factor causes so many cable failures. We've licked this problem with what we call dynamic balance. We start with carefully annealed copper wires and concentrically strand them into pre-stressed, rope lay conductors. These dynamically balanced conductors, as opposed to loosely bunched groups of fine wires, give balanced performance and long, trouble-free service. Unequal tension and elongation are eliminated and there is no loss of flexibility. Each conductor is then insulated with a tough, heat-resistant rubber specially compounded to exceed ASTM requirements.



A rugged, flame-proof jacket of Amerprene is vulcanized in a continuous lead sheath for a smooth, high-density surface that won't snag or tear. That's why we can truthfully say, USS Tiger Brand Amerclad Cable is the toughest cable you can buy. Dynamic balancing is just one of the extra steps we take to assure you of top performance.

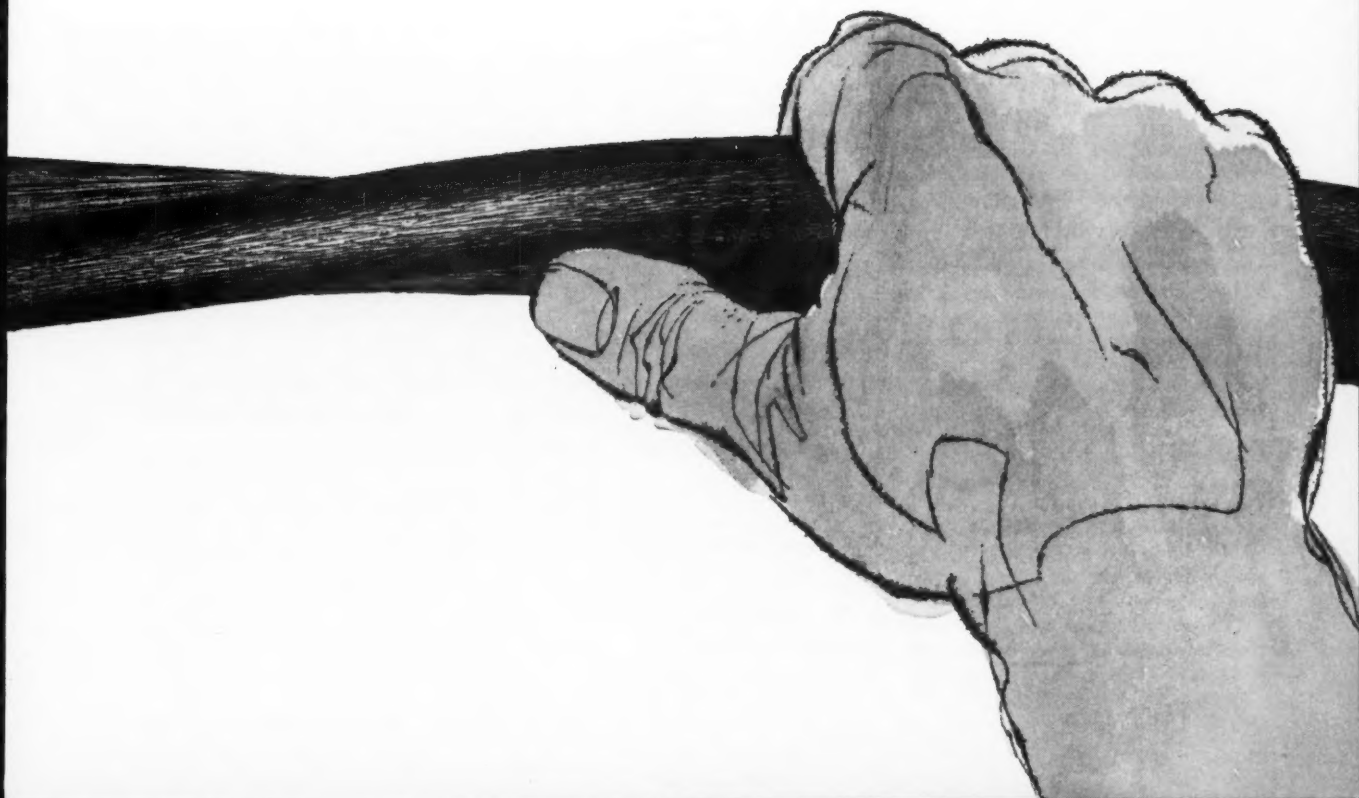
For every *special* job there's a standard USS Tiger Brand electrical wire and cable. Write for the complete story on Amerclad cables. American Steel and Wire, Dept. 1258, Rockefeller Building, Cleveland 13, Ohio.

USS, Tiger Brand, Amerprene and Amerclad are registered trademarks.



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News Roundup

Coal Injected Into Blast Furnace To Improve Operating Efficiency

An important new break-through in iron production technology is indicated by the results of using coal to partially replace coke as a blast furnace fuel, it was stated Aug. 23 by Julius H. Strassburger, vice president—research and development, National Steel Corp., Pittsburgh, Pa.

Preliminary findings of small-scale experiments have been supported by further experience with a solid fuel injection system on a commercial blast furnace, Mr. Strassburger said. This installation—the first in history—is at the plant of The Hanna Furnace Corp., Buffalo, N. Y., subsidiary of National Steel. Bethlehem Steel Co. is participating with National in the research venture.

Much additional experimental work remains to be done, Mr. Strassburger said, but the experience thus far gives firm indication of the following results:

Substantial savings in the cost of blast furnace fuel.

Additional savings from a reduced need for investment in coke oven capacity.

Improved operating efficiency.

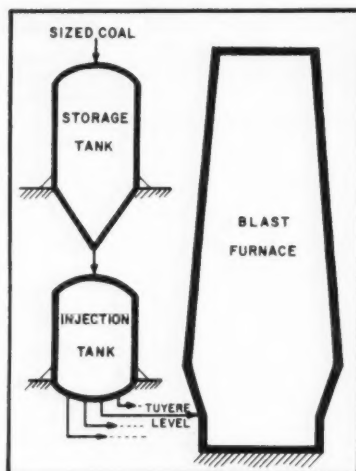
Higher production with no increase in furnace size.

Ability to use the abundant lower quality noncoking coals instead of the more scarce and costly metallurgical grade now required in blast furnace operation.

Although the new development causes a net reduction in the total amount of coal used in a blast furnace, it will have a beneficial effect on the coal industry because it provides an answer to the competitive threat of natural gas and fuel oil as alternate blast-furnace fuels.

"In addition to its direct technical advantages, the coal-injection system promises contributions of a more general nature which are also highly important," Mr. Strassburger said. "The first is that lower cost iron will translate into savings in the cost of steel production. This will give badly needed help to the American steel industry's position in world markets which has been weakened by the disproportionate increase in our costs compared with the costs of foreign steel producers.

"The second is that coal is our most abundant source of energy and would be readily available within our borders



in the event of any emergency which created a scarcity of natural gas or fuel oil."

Coal for the injection system is crushed and screened to minus 1/8 in and then conveyed by a vacuum system to an overhead storage tank. The coal is passed under pressure from the storage tank to a charging vessel where it is kept in a fluid condition by compressed air agitation. Metered quantities of the coal are delivered from the vessel through a system of tubes to stainless-steel lances at the tuyeres through which the coal is injected into the blast furnace.

The tuyeres are water-cooled copper "port holes" evenly spaced around the circumference of the furnace at the hearth area near the bottom. Their principal function is to admit and distribute the high velocity blast of hot air that supports combustion which smelts raw materials into molten iron.

In the first stage of experimentation with the coal injection system, Mr. Strassburger said, coal use amounted to 10% of the normal requirement. Currently, coal use has been stepped up to 20% and will be increased to 30% this month. Coal replaces coke on an approximate ton-for-ton basis, he said. In modern blast furnace practice, without using injected fuels, from 1,300 to 1,500 lb of coke are consumed per ton of pig iron produced.

So far the only coal tested in the Hanna furnace has been low-volatile bituminous. This was continued through August and in succeeding months the research program will include tests of high-volatile bituminous and anthracite.

The direct savings from replacing coke with coal will vary with different blast furnace plants because of location and other economic factors but in any case should prove worthwhile, Mr. Strassburger said. As to the saving in investment, he estimated that the cost of a coal-injection system would range between 20 and 25% of the cost of equivalent coke oven capacity.

The comparative advantages of coal, natural gas and fuel oil as alternate fuels for coke in blast furnace operation would be determined by economic factors with plant location the most important.

Coal injection is the latest in a series of developments which have been made on an accelerating basis in recent years to improve the efficiency and increase the production of blast furnace operations. These include the careful selection and preparation of coals, improvements in the physical characteristics and sizing of coke, sintering and pelletizing of iron ore, high top pressure, higher blast temperatures, use of oxygen to enrich the hot air blast and precise control of moisture.

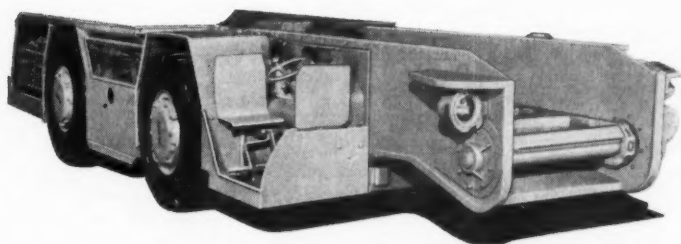
In combination with these improvements, coal injection will contribute further technical progress through its production of richer gases in the hearth area which speed up furnace reactions and increase operating efficiency. Mr. Strassburger predicts that optimum results will be obtained through the use of uniformly sized burdens, higher blast temperatures and oxygen enrichment.

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Another Time-Proven
TOR KAR *Fact...*

Availability
 as high as **95%**



Type 48 AC or DC TorKar, built in heights from 36" through 60". A full line of AC, DC and diesel-powered TorKars is manufactured by National Mine to meet every operating requirement. Write for descriptive bulletins.

Shuttle car downtime can be cut to a mere fraction of accepted "normal" when TorKars are on the job! You can expect and receive, in company with many mine operators, availability as high as 95% with these sturdy, dependable cars. The reasons are clear: One motor instead of multiple motors, resulting in simplified electrical control; shock-easing torque converter; heavy-duty wheel units; rugged construction of body and frame—all contribute to TorKar's continual operation with minimum maintenance and repair.

If you are losing tonnage through shuttle car failure and downtime, ask your National Mine man for the facts on TorKar—or write!

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**National Mine
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Koppers Building Pittsburgh 19, Pa.

Will Try Hydraulic Mining On Pitching Coal

Continuing its research in extracting coal by the hydraulic-mining method, the Bureau of Mines has joined forces with the Northern Pacific Railway Co.

Because much of Washington's coal lies in "steeply-pitching" beds which cannot be removed by modern mining machinery, the purpose of this joint venture is to determine whether this coal can be mined with powerful water jets. A pump capable of supplying water at pressures up to 4,500 psi will be installed at the railway company's Roslyn mine, about 70 mi east of Seattle, where steeply-pitching beds are encountered. The nozzle output would be about 40 gpm. Tests conducted by the bureau in a central Pennsylvania mine showed that eastern bituminous coals broke readily at even lower pressures but with larger volumes of water. However, the coal in Pennsylvania was nearly horizontal.

The Washington experiment should more closely establish the conditions necessary for successful hydraulic operations in different coal seams under varying geologic conditions, according to Bureau Director Marling J. Ankeny.

Earl R. McMillan, manager of the railroad's coal operations, told the bureau that the development of coking coal deposits in other areas in the state "is intimately related to the success we hope to obtain from hydraulic mining." Hydraulic mining is being considered as the extraction method for some 800,000 tons of coking coal contracted by the Mt. Rainier Coal Co. for shipment from its Washington mines to Japan.

In a similar hydraulic project in Pennsylvania's anthracite region, also characterized by steeply pitching coal, the bureau will also conduct tests, raising pressures and volume to 5,000 psi and 300 gpm to extract this "harder" coal.

Hanford A-Power Bill Fight Continues

Fur is still flying in the fight over the government-subsidized Hanford atomic-power project.

The week of Aug. 7 saw the House of Representatives instruct its conferees to insist on deleting the Hanford project from the Atomic Energy Commission bill. However, regardless of the 235-164 House vote, the rules allow House conferees to ignore these instructions. The House had deleted the Hanford project when it passed the bill but the Senate restored it by a vote of 54-36. If and when House and Senate conferees iron out differences between the House and Senate versions of the measure, it will be returned to both bodies for final approval.

The Hanford atomic reactor, designed

primarily to produce plutonium for defense purposes, is scheduled for completion next year. It will be world's largest reactor and, when completed, will produce, as a byproduct of its operations, about 11 million lb of steam an hour. The proposed nuclear-power plant would transform this steam into electrical energy. Estimated capacity of the process is 800,000 kw, which would serve the Pacific Northwest.

Although coal interests are somewhat divided on the issue, private utilities, the NCA, UMW and others, have taken strong stands against the Hanford project. Rep. Cleveland M. Bailey (D W. Va.) presented figures showing that the 800,000 kw of power from Hanford would be equivalent to the consumption of more than 2 million tons of coal annually. The opposition also feels that the project represents unwarranted fed-

eral intrusion into electric power generation and distribution.

Proponents argue that the area which would be served by the electricity generated from Hanford steam, would not hurt coal. Eastern coal, they reason, is not used in the Hanford area because of shipping costs and the Northwest has no stores of coal for power production by steam plants.

Oil and Gas Man Joins FPC

Some well-publicized opposition from 12 senators met President Kennedy's nomination of an oil and gas industry man—Lawrence J. O'Connor Jr.—to the five-member Federal Power Commission.

The nomination represented one step toward reorganization of the gas-regulating body as outlined by the President last May (*Coal Age*, June 1961, p 26). Among other things, the President had recommended adding two more members to ease the work-load in an attempt to speed settlement of an overwhelming backlog of rate cases.

Opposition to O'Connor's appointment was dramatized on the Senate floor in an all-night speech lasting almost 26 hr by Senator William Proxmire (D-Wis.). After his self-imposed ordeal, the senator explained to press men that although he did not expect to block the appointment, the purpose of his long oration was to alert the country to the economic and political power of the oil and gas industry and thoroughly document his case against the O'Connor appointment. His main point was that Mr. O'Connor, having vast gas holdings and having been associated with the oil and gas industry most of his adult life, had a built-in bias against consumers and in favor of the industry. Previously assistant director of the Office of Oil & Gas in the Interior Department, Mr. O'Connor had been named oil import administrator in July, 1960.

The 83 senators supporting the appointment argued that Mr. O'Connor had given satisfactory assurances at committee hearings that he would act impartially and in the public interest. In his own defense, Mr. O'Connor said he would divest himself of all stocks that might put him in a position of conflicting interest.

On Aug. 9 the Senate confirmed the appointment as had been expected even by the opposing senators.

Nine days later, on Aug. 18, President Kennedy named Joseph C. Swidler chairman of the FPC despite threats that such a move would be challenged in the courts. Mr. Swidler, a former Tennessee Valley Authority general counsel and long-time advocate of public power, had been confirmed as a commission member in June. He would replace Jerome Kuykendall who will remain as a commission member.

Coming Meetings

Electrical World (McGraw-Hill Publication) Fifth Electrical Heating Conference, Sept. 25-26, 1961—Sheraton Park Hotel, Washington, D. C.

Annual Meeting, ME-MMA, Sept. 30, 1961 — Mountain View Hotel, Greensburg, Pa.

National First-Aid and Mine-Rescue Contest, Oct. 2-4, 1961—Civic Center, Charleston, W. Va.

Southern Research Institute, Coal Technology Conference, Oct. 3-4, 1961—Dinkler-Tutwiler Hotel, Birmingham, Ala.

Joint Solid Fuels Conference, AIME-ASME, Oct. 5-6, 1961—Dinkler-Tutwiler Hotel, Birmingham, Ala.

Coke Production Seminar and Plant Tour, Oct. 5-7, 1961—Michel, British Columbia, Canada. For information on travel and hotel reservations, write Coke Production Seminar, 1450 University Ave., Palo Alto, Calif.

National Safety Congress, Oct. 16-20, 1961—Conrad-Hilton Hotel, Chicago, Ill.

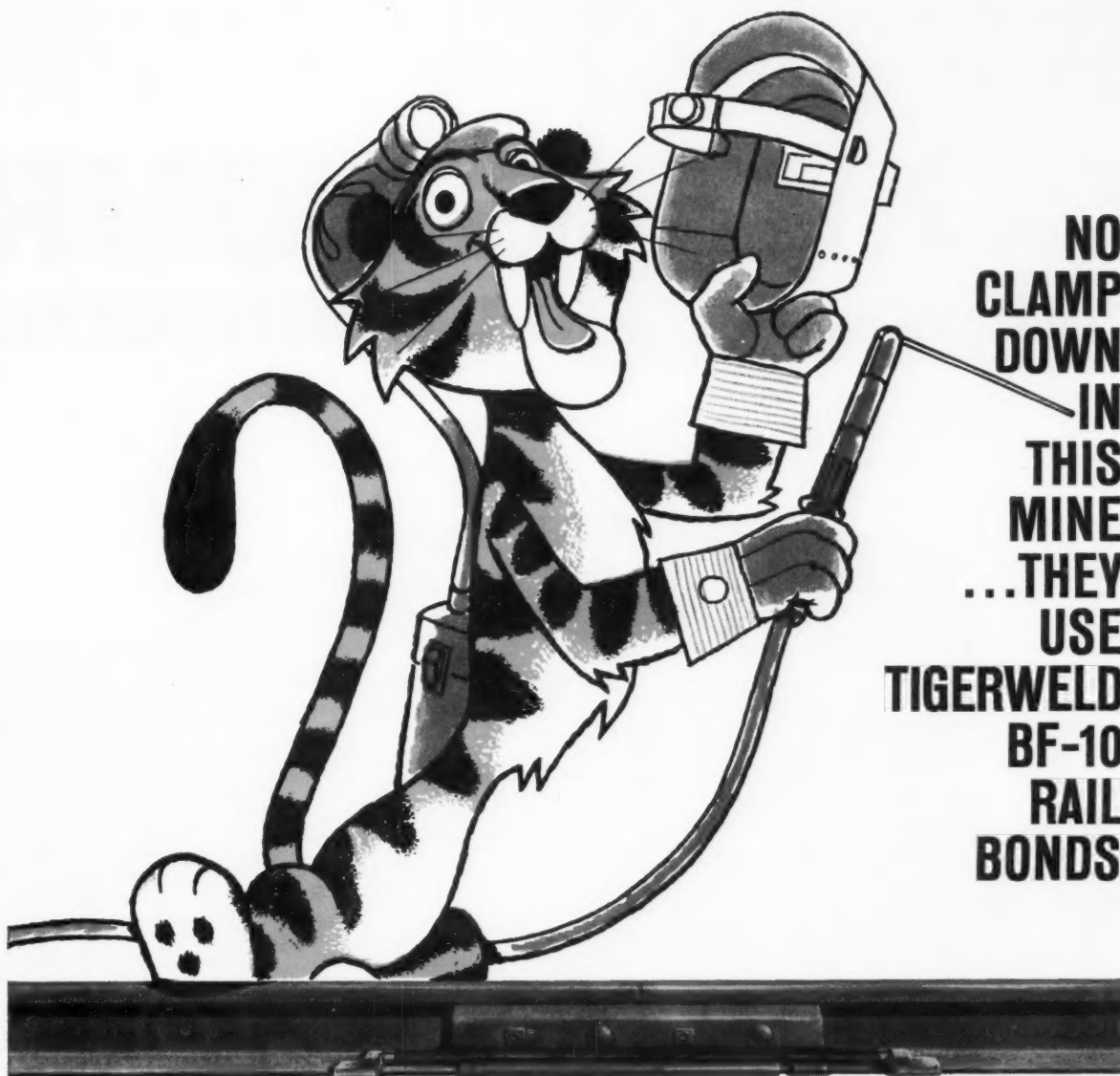
Illinois Mining Institute, Oct. 20, 1961 — Hotel Abraham Lincoln, Springfield, Ill.

West Virginia Coal Mining Institute, Central Appalachian Section, AIME, Nov. 3-4, 1961 — Greenbrier Hotel, White Sulphur Springs, W. Va.

Kentucky Mining Institute, Nov. 9-10, 1961 — Phoenix Hotel, Lexington, Ky.

Coal Division Conference, American Mining Congress, Nov. 17, 1961 — Penn-Sheraton Hotel, Pittsburgh, Pa.

Coal Mining Institute of America, 75th Annual Meeting, Dec. 14-15, 1961 — Penn-Sheraton Hotel Pittsburgh, Pa.



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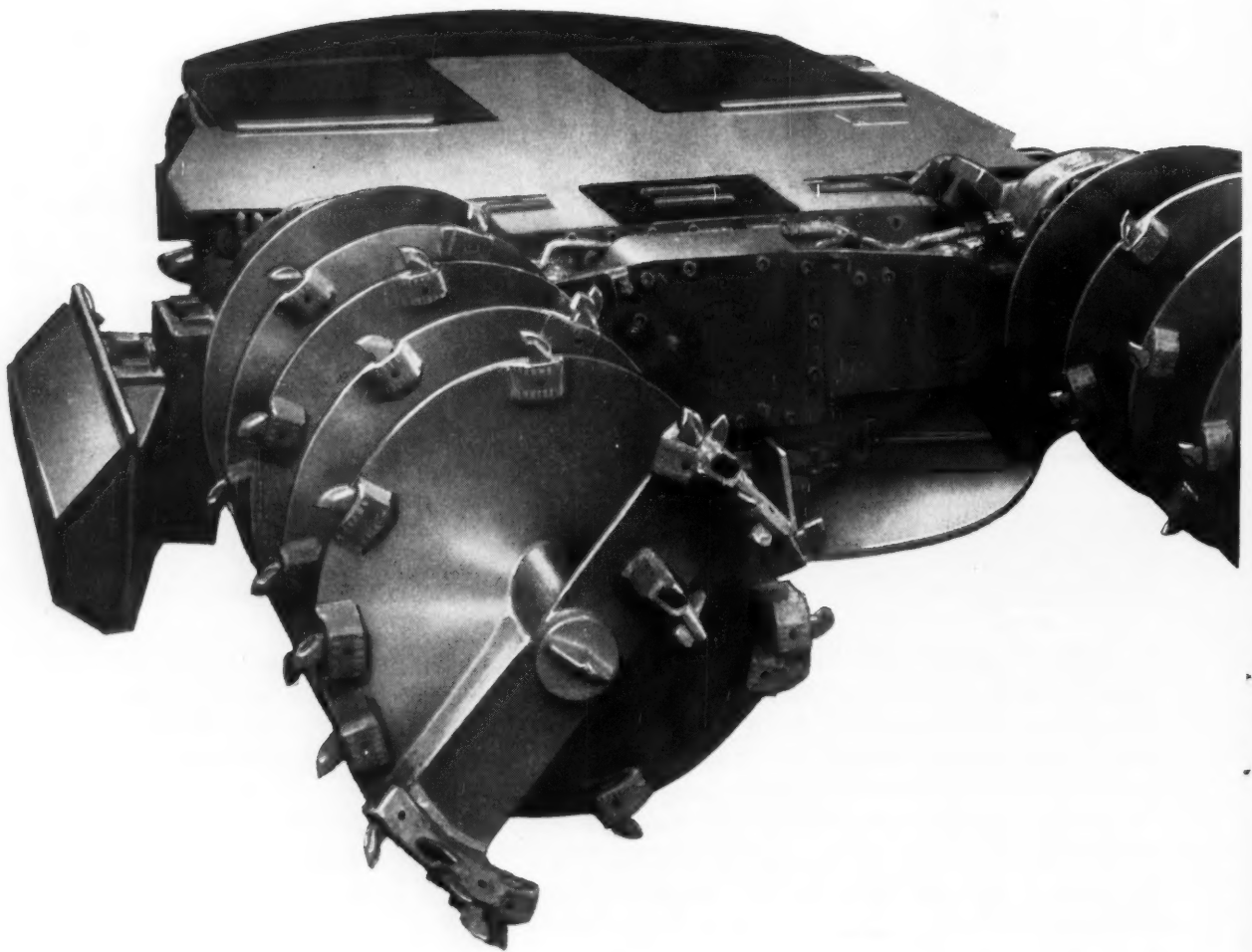


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A gathering conveyor, having a single strand chain with cast steel flights, gathers the loose coal from between the augers and delivers it to the rear of the machine where it is discharged onto a bridge conveyor. Hydraulically-operated gathering plows on both sides of the machine help to move and retain the mined coal within pick-up limits of the augers.

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People in Coal



R&P Fills VP Post

WILLIAM J. SHIELDS, a 26-yr veteran of Rochester & Pittsburgh Coal Co., has been elected to the office of vice president-operations of the company on Aug. 1.

Continuously employed by R&P since 1935 when he graduated from Pennsylvania State University, Mr. Shields was first a rear chainman from which he advanced to division engineer. He then progressed to assistant mine foreman, mine superintendent, assistant production manager and chief mining engineer. Prior to his recent appointment, he had been assistant general manager and acting production manager.

A registered professional engineer, Mr. Shields is a member of the mechanical-loading committee of the American Mining Congress, a board director of the Coal Mining Institute of America and a member of the Oil & Gas Inspectors' Examining Board of the Commonwealth of Pennsylvania.

A. C. Sedlachek, recognized as a leading authority on the use of coal in coke-producing, has been appointed assistant to the vice president in the Coal Div. of Eastern Gas & Fuel Associates. Joining Eastern in 1928, he served as superintendent of operations at its Philadelphia Coke Co. plant. In 1949 he was transferred to the Boston offices as an engineer and in 1954 he became manager of the firm's Everett coke plant and blast furnace.

George H. Love, board chairman of Consolidation Coal Co., has been appointed chairman of the executive committee of the Chrysler Corp. following the resignation of **L. L. Colbert** as president and chairman. Previously a director, Mr. Love will take an active part in Chrysler's affairs. In addition he will continue as chairman of Consol but will resign as chairman of the M. A. Hanna Co. and director and member of the executive committee of National Steel Corp.

Several personnel changes have been announced by Christopher Coal Co., a Consolidation Coal Co. subsidiary. **William N. Poundstone**, formerly general superintendent, moved up July 12 to assistant to vice president of operations. He had worked as a miner with the company during vacations while attending West Virginia University and became a full-time employee upon his graduation in 1949. Positions he held include engineer, section foreman and

mine superintendent. Succeeding Mr. Poundstone as general superintendent of Arkwright and Osage mines is **James L. Margo**, who had been superintendent of Pursglove No. 15 mine. **Vincent H. Ream**, formerly assistant superintendent at Pursglove, replaces Mr. Margo as superintendent.

John H. Melvin, formerly general manager of the Pennsylvania Drilling Co. and onetime state geologist of Ohio, has assumed practice as a consulting geologist with headquarters in Pittsburgh.



Wayne A. McCurdy, as the newly-appointed chief of the division of mining

and preparation in the Interior Department's Office of Coal Research, will be responsible for evaluating coal-research proposals involving mining technology, equipment, processing and preparation. In addition, he will render staff support to the director of the Office of Coal Research.

Since 1956 Mr. McCurdy had been editor of *Mechanization*. His mining experience has included mining engineering, industrial engineering and various supervisory jobs with Christopher Coal Co., Mountaineer Coal Co., and Island Creek Coal Co., in West Virginia.

Born in Seattle, Wash., in 1920, he graduated from West Virginia University and is a lieutenant commander in the U. S. Naval Reserve.

William J. Orlandi, assistant vice president, Peabody Coal Co., has been named Illinois' new director of mines and minerals, succeeding **Ben M. Schull** who held that post since 1953. An experienced miner, Mr. Orlandi has served Peabody as a miner, resident and mining engineer, face boss, assistant mine manager and production manager.

Truax-Traer Coal Co., Chicago, has elected **J. H. Price**, vice president-sales, and **H. M. Tibbs**, vice president-operations, directors of the company. Mr. Tibbs had served as manager of the firm's western division from 1953 to 1959, when he was appointed assistant to the president.

(Continued on p 42)

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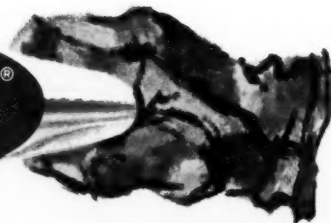
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Current Coal Patents

Oliver S. North

Patent Research and Abstracting
Washington, D. C.

Mine conveyor, S. C. Moon (assigned to The Jeffrey Mfg. Co., a corp. of Ohio), July 18, 1961. Improved conveyor assembly comprising a bridge conveyor adapted to be connected to the discharge end of a continuous mining machine for receiving mined material therefrom, and a pan conveyor which is connected to and receives coal from the bridge conveyor. No. 2,992,722.

Extensible belt conveyor, W. N. Poundstone (assigned to Consolidation Coal Co., Pittsburgh, Pa.), July 18, 1961. Design for a flexible, easily assembled and dismantled, readily transportable extensible belt conveyor mechanism provided with the head pulley detached from and in spaced relation to the belt drive mechanism. Cribbing type platforms need not be constructed to support the elevated drive mechanism, and the space formerly needed for such platforms can be utilized advantageously for storing strands of belting. No. 2,992,723.

Extensible belt conveyor, W. N. Poundstone (assigned to Consolidation Coal Co., Pittsburgh, Pa.), July 18, 1961. Portable, track-mounted drive mechanism for an endless belt conveyor. The mechanism is arranged transversely to the conveyor reach of the belt, is supported by a base frame member, and has self-contained roof and floor jacks which eliminate the use of cribbing and pillars. No. 2,992,725.

Drilling apparatus, J. D. Russell (as-

signed to Joy Mfg. Co., Pittsburgh, Pa.), July 25, 1961. An improved drilling apparatus for drilling tunnel faces is provided with an adjustable mounting for a battery of drills which enables quick positioning of the drills at the face and their ready retraction into transport positions. No. 2,993,685.

Mining apparatus having core forming and core bursting means, J. F. Joy (assigned to Joy Mfg. Co., Pittsburgh, Pa.),

Aug. 8, 1961. Construction for an improved cutting and dislodging head for a continuous miner of the U-bar type, whereby a kerf is formed in the mine vein along a closed path circumscribing the section of coal to be dislodged. The core is dislodged by applying a powerful pressure via breaker wedge means. A substantially rectangular section is broken, so as to leave a plane floor and roof and parallel vertical plane sides. No. 2,995,352.



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Bituminous Output

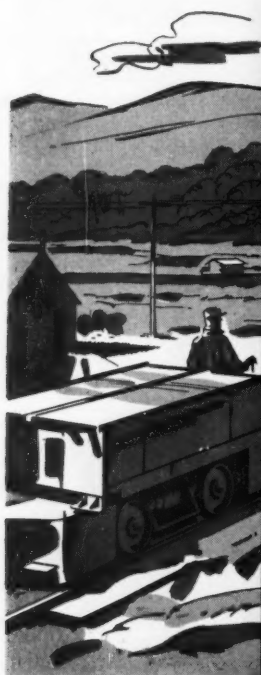
YEAR TO DATE	PRODUCTION
Aug. 19, 1961	235,990,000
Aug. 20, 1960	264,660,000
1961 output 10.8% behind 1960.	

WEEK ENDING	PRODUCTION
Aug. 19, 1961	8,200,000
Aug. 20, 1960	8,104,000

Anthracite Output

YEAR TO DATE	PRODUCTION
Aug. 19, 1961	11,167,000
Aug. 20, 1960	11,425,000
1961 output 2.3% behind 1960.	

WEEK ENDING	PRODUCTION
Aug. 19, 1961	343,000
Aug. 20, 1960	356,000



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Aluminum Coal Cars, 2 Tons Less than Steel Cars

A rarity less than a year ago, aluminum mine cars have ascended from experimental to production status.

Irwin-Sensenich Corp., Irwin, Pa., has started production of two lots, totaling 125 units, of the light-metal coal carriers for use by a major U. S. coal producer. The cars will be constructed of plate and extrusions made by Aluminum Co. of America.

In trial runs, the experimental aluminum cars proved an economical advantage because of their light weight (about 2 tons less than steel cars) and also passed a rigorous and impromptu strength test. In a derailment, one aluminum car received minor damage while conventional cars were wrecked more severely.

One important advantage arises from the fact that aluminum reduced dead-weight by 40%. Thus operators can move more cars per train. In addition aluminum cars dump cleaner, are more resistant to corrosive elements of mines and require no painting to be visible in dark tunnels.

2nd W. Va. Mining and Industrial Show

The second West Virginia Mining and Industrial Show which will take place Sept. 19-21 at the Charleston Civic Center (W. Va.), is expected to be even larger than the first show in 1959.

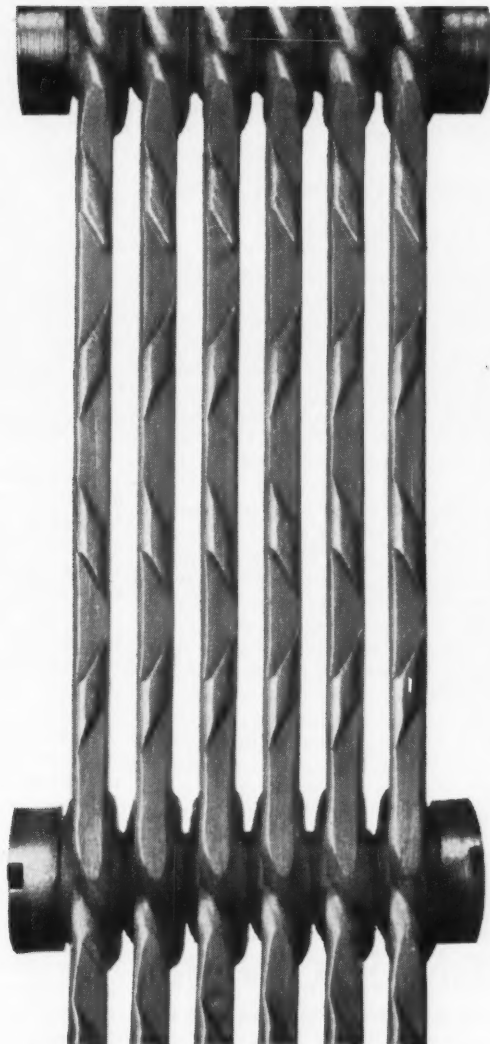
A total of 7,021 persons attended the 1959 show to view products and services of 359 exhibitors. More than 5,500 of the total attendance represented management, production, engineering and sales personnel from 29 different states.

This trade exposition is sponsored by the Charleston Chamber of Commerce which plans to stage the show biennially in the odd year.

EG&FA Enlarges Coal Preparation Plant

A major addition to the coal preparation plant is starting to take shape at the Keystone mine of Eastern Gas & Fuel Associates at Keystone, McDowell County, W. Va., representing part of Eastern's multimillion dollar improvement program.

The first phase, a heavy-media washer which replaced a baum jig, went into operation early in July while a heavy-media cyclone addition began operating Aug. 1. In addition, froth-flotation cells with their associated filtering equipment, large concrete-blending bins and centrifugal-drying facilities are scheduled for the new facility.



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Oil Import Allocation Method Called Unfair

"Unfair, inequitable, arbitrary and discriminatory" were adjectives Standard Oil Co. (N.J.) applied to the Government's method of allocating crude oil imports to individual importers.

In an action filed Aug. 2 in Federal District Court for the District of Columbia, the oil company seeks a declaratory judgment that this method of allocating crude oil imports fails to meet the requirements of the President's proclamation that there should be a "fair and equitable distribution" of allowable imports.

Its allocation, the company pointed out, is based on a sliding scale which discriminates among refiners based on the quantity of their refinery inputs. If the purpose of the Mandatory Oil Import Program is, as has been announced, to stimulate domestic crude oil exploration and production, the company contends that there is no justification for the present allocation system which gives unequal treatment to competitive refiners.

The company stressed that it was not attacking the control of oil imports as provided for in the President's proclamation but contending that the regulations do not comply with the proclamation.

Named as defendants in the law suit are Interior Secretary Stewart L. Udall, Lawrence J. O'Connor Jr. as administrator of the Oil Import Administration and the Department of the Interior.

Pa. House Passes Bill for Coal Pipelines

Legislation to pave the way for transportation of coal through pipelines in Pennsylvania squeaked through the Pa. House of Representatives on Aug. 8 but faced a dim future in the State Senate.

The bill had been defeated earlier in the House at the hands of the railroads, trucking interests and unions, which see more competition resulting from its passage.

Balloting was largely along party lines with the Democrats for and Republicans against. Democratic Majority Leader Rep. Stephen McCann denied Republican charges that the measure is designed for the "cheap" transportation of West Virginia coal into Pennsylvania. Republicans also opposed the bill on the grounds that it would further endanger the financial outlook of the railroads and hurt the trucking industry. Another argument was brought forth by Rep. James S. Bowman, who is regarded as a constitutional law authority on the Republican side of the

House. He warned that the measure was unconstitutional because Pennsylvania's basic law prohibits a producer from also being a transport carrier, stating that he understood that coal-producing interests plan to go into the coal-pipeline business if the measure becomes law.

The measure (H. 1656) authorizes the incorporation of pipeline companies for the transportation, storage and distribution of coal slurry, and grants such companies the right of eminent domain in taking over property for such purposes.

FPC Allows Import Of Canadian Gas

In a significant opinion reflecting views of new commissioners Morgan and Swidler, the Federal Power Commission allowed importation of Canadian gas to serve upstate New York, rejecting a local supplier's offer to serve that area.

The new FPC commissioners stressed the declining reserves of U. S. gas and said importation from Canada "is to be preferred to the use of the domestic supply."

As a result the St. Lawrence Gas Co. will import 16.7 million cu ft of Canadian natural gas a day to supply its New York customers. The New York State Natural Gas Corp. made the bid the FPC turned down.

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Austin-Brownie pumps are built for long, trouble-free service. They are available in four sizes suitable for capacities up to 100 GPM and for heads up to 250 feet. Electric motors and control equipment are available for the usual mining voltages in drip-proof, enclosed fan-cooled, or explosion-tested construction.

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Austin-Brownie Pumps are now Built and Sold by Flood City Brass & Electric Co. For an economical answer to your pumping problems, write today for complete information on the Austin-Brownie Mine Gathering Pump.

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UMW Denied New Trial

The United Mine Workers, knee-deep in antitrust suits of late, was denied a new trial by U. S. District Judge Robert L. Taylor in one such suit filed by Phillips Bros. Coal Co. Counsel for both sides frequently stated during the 5-wk trial that the final decision in the case would be precedent-making.

The jury, finding that the UMW and UMW Welfare Fund trustees conspired with large mining firms to monopolize the industry and force small miners out of business, awarded Phillips a judgment totaling \$270,000. Under the Bituminous Coal Wage Agreement of 1960, coal firms are required to pay on each ton of coal produced, 40¢ to the union's Welfare Fund. Phillips said the UMW used this tax-free money as an instrument to carry out its conspiracy. Star witness at the trial was John L. Lewis, retired president of the UMW.

Judge Taylor also awarded Phillips' attorney, John Rowntree, \$55,000 as his fee in the case.

Late Note: On Aug. 15 Judge Taylor ordered Phillips to pay the fund \$43,424 in back royalties on 108,560 tons mined. This action stems from a suit the UMW had filed against the coal company.

Phillips did not defend itself against the UMW claim but countered with the cross suit charging antitrust violations.



WHY IT COSTS LESS TO OWN A CAT GRADER

Most motor graders *look* pretty much alike, no matter who makes them. They handle similar jobs, too, and it isn't always easy to *see* any big difference in the way they handle them. In fact, the manufacturer's suggested prices usually are not greatly different for machines of nearly equal specifications—regardless of the "deal" that may be offered a buyer. But *used* motor graders vary considerably in price. Why?

The Buyer Determines Price

A used machine is priced at what the buyer is willing to pay . . . it's a measure of what *he* thinks is left in a machine. So, with used equipment, the buyer sets the price. This is clearly demonstrated at used equipment auctions. A check of auction prices throughout the country shows, for example, that the Cat No. 12 Motor Grader brings substantially higher prices than comparable machines of other makes—as much as 80% more. (Only machines of the same age, same condition and with similar attachments were compared.) What makes a Cat Motor Grader more desirable than other makes?

A Feature That Affects Cost

Any machine is desirable if it is known to be dependable. This reputation can

only be the result of true quality design and quality construction. The Cat oil clutch is a good example. It was designed and is built to give long, trouble-free life. But, how well does it do it? Let's examine the records of just one Caterpillar Dealer who has 161 oil clutch-equipped motor graders in his territory. His records show that in four years he has sold only \$24.38 worth of parts for motor grader oil clutches! One machine in his territory went 2524 service meter hours without any work on the clutch. Many users report 2000 hours of service before the first adjustment. In 1000 hours of operation only about .0025 inch of wear can be expected—less than the thickness of a human hair. And, since all parts are constantly bathed in oil there is no need for lubrication maintenance. Less wear, less attention mean not only lower total repair costs but more time on the job . . . less down time. Of course, the oil clutch is just one example of many quality features in Cat Graders.

A Look at Total Cost Records

The cost records of private owners and governmental bodies show which machines cost less. For example, an Indiana county keeps individual cost records on their six motor graders, 14 trucks, three loaders and five tractors.

Their records showed that a year-old No. 12 needed only a set of head gaskets and two spark plugs with \$25 labor, while two newer graders of another make needed major engine repairs, new clutches and side shift linkage. One town in New Hampshire reports that in over 20,000 hours, their No. 12 has never had a breakdown that held up work more than three hours. Operating costs—24¢ per hour exclusive of fuel, oil and operator. Comparing a Cat No. 12 to another make (after 3½ years' service), the records of an Arkansas county showed a saving of \$2478.57 in parts and labor for their No. 12.

What's in It for You

Others have proved that Cat Motor Graders cost less in the long run because they are built better in the beginning. Your Caterpillar Dealer has additional facts and figures on low-cost operation of Cat Graders in your area. Ask him for free Cost Record Books so that you can keep individual machine records on your equipment. Prove to yourself that it costs less to own a Cat Grader.

Caterpillar Tractor Co.,
General Offices, Peoria, Ill., U. S. A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.



Bethlehem Forged-Steel Mine Car Wheels ... you can depend on them all the way

Bethlehem Mine Car Wheels are made of a special grade of open-hearth steel. The forging process removes the objectionable properties of the cast-ingot structure, and gives the wheels great strength,

toughness, and resilience for long, trouble-free life.

We can furnish wheels in 12-in., 14-in., 16-in., and 18-in. diameters. They are tried and proved; you can depend on them all the way.



*for Strength
... Economy
... Versatility*

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



Coal Abroad

Britain Seeks Site for Gasification Plant

Britain's National Coal Board and Gas Council are seeking a possible location for its Lurgi gasification plant which the board says would be the country's biggest and cheapest gas producer. The plant would consume 1 million long tons of coal annually, produce 109 million cu ft of gas and use 3 million gallons of water a day.

Through the use of new techniques the board hopes to reduce the cost below the approximately 10c a therm estimated 2 yr ago. Lord Robens, board chairman, said he was confident municipal gas could be made from coal as cheaply as importing liquid methane. Four colliery sites in the East Midlands are being considered.

A few months ago the government had dropped projects for making oil from coal as a result of committee findings which concluded that prospects for making oil from coal economically were very remote.

ECSC Coal Production Drops Slightly

Coal production of the European Coal & Steel Community totalled 117.3 million metric tons in the first half of 1961, a drop of less than 1% from the 118.2 million tons produced in the same period of 1960.

A decrease of 5.9% in French production and of 4.2% in Belgian production this year compared to last was compensated by a rise of 1.1% in Germany and of 8.1% in the Netherlands.

In the third quarter of this year, ECSC expects the area's total production to reach 55.9 million tons. Coal consumption is predicted to drop by 1% from the level set in the third quarter of 1960. Imports from countries outside the area are slated to rise by 5% to 5 million tons.

Overseas Flashes

JAPAN—Approved plans for 1961 call for coal production of 54.8 million tons, up 5% over 1960, and a modernization program of \$98.3 million, up 16% over 1960. The modernization program features increased use of machinery to raise the productive efficiency of the average miner's monthly output from 18 tons last year to 21.2 tons this year. In

addition, Japan expects to import 8,530,000 tons of high-grade coking coal in 1961, against 6,248,000 tons in 1960. Total imported coal for 1961 is estimated to reach 10,671,000 tons, compared to 8,697,000 in 1960.

GREAT BRITAIN—Although it appeared for a while that there might be some "coals to Newcastle," the British Board of Trade finally came out with an emphatic "No." For several months the government had been debating whether to import American coal to be used by British steel companies at about \$3 and \$4 less a ton than home-mined coal. In making the announcement, Reginald Maudling, board president, said that the private import of coal "would be a major departure of policy." This decision was welcomed by the National Union of Mineworkers, which had threatened to strike. But Sir Julian Pote, chairman of the Steel Co. of Wales, which asked for the import license, said the company's export business would be hurt as a result.

INDIA—To assist its private coal-mining industry, the World Bank has granted India a \$35 million loan. The bank said that coal production will have to be increased by 80%—from the present 54.6 to 97 million tons in 1966—to meet industrial goals of India's third 5-yr plan. Four private banks are participating in the loan, without the World Bank's guarantee, to the extent of \$875,000.

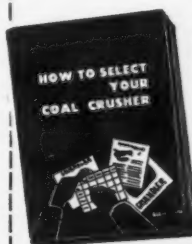
Among other countries lending India a helping hand toward goals of her third 5-yr plan is Poland. The Polish firm—CEKOP—and the National Coal Development Corp. have agreed to develop a deep-shaft mine project in Sudamdih in Jharia, in Bihar. With a total reserve of nearly 250 million tons of coal in the area, planned output of raw coal is 7,500 tpd. A coal washing plant will be included in the project.

POLAND—Going ahead with plans to substantially expand her coal mining industry, Poland will sink four new shafts in addition to the four pits now being opened in the Rybnik Basin where coking coal has been located. When in full operation, opencast mine Turow II alone will contribute 10 million tons annually to brown-coal production. In addition, a vast extension of coal-preparation facilities will result in 97% of all coal being screened and 37% mechanically cleaned. By 1965 it is expected that Poland will mine 113.6 million tons of "hard coal" (as compared to 103 million tons in 1960) and 27 million tons of brown coal (1960—9.3 million tons).

Considering a new Crusher?

—WRITE FOR THIS—

INFORMATIVE BROCHURE

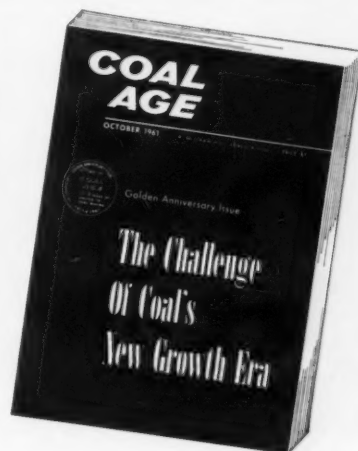


Brochure No. 154 shows a variety of crushers and pulverizers with complete specifications. It will prove invaluable when determining the crusher best suited for your needs.

Gruendler Pulverizers are especially recommended for pulverizing coal for fuel in coal drying systems.

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Gruendler Crusher & Pulverizer Co.
2915 N. Market • St. Louis 6, Mo.



Coming Next Month

COAL AGE's Special
50th Anniversary
Issue . . . A Blueprint for
Coal's Progress in the 60's

Robert W. Bruce has been elected president, chief administrative officer and director of Jewell Ridge Coal Corp. and Jewell Ridge Coal Sales Co. He left the Pittsburgh National Bank as senior vice president to accept the new post.

Upon his graduation in 1935 from Bucknell University, where he majored in business and finance, Mr. Bruce embarked upon a banking career with National City Bank of New York. In 1956 he was elected vice president of the Peoples First National Bank & Trust Co., Pittsburgh. When that bank merged with Fidelity Trust Co. he became senior vice president of the new company—Pittsburgh National Bank. In that capacity he acquired wide experience in matters affecting the coal and other industries.

Pennsylvania State University's Department of Mining Engineering has welcomed Charles W. Berry as research assistant in charge of developing the program of operations research for the mining industry now being undertaken at Penn State. Mr. Berry had been mining taxation engineer with the Minnesota Tax Commission. His experience includes 4½ yr in the iron mining industry and 2 yr in taxation work.

Associations



Fred D. Bullard, formerly executive secretary, has been named president of the Kentucky Coal Association succeeding B. F. Reed who has been elected chairman of the board. In addition, Joseph H. Lyons has been chosen secre-

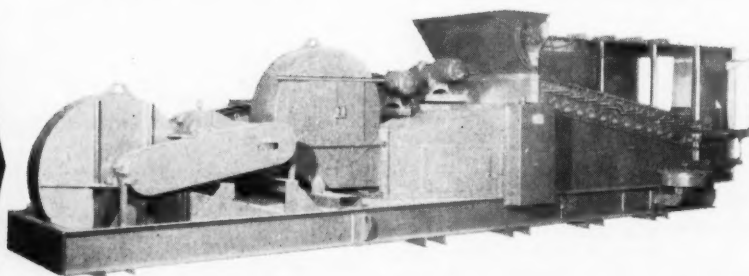
tary and assistant treasurer and James R. Love, treasurer. On Sept. 1 Messrs. Bullard and Lyons moved to Lexington, Ky., where the association opened offices at 137 E. High St.

New directors, in addition to Mr. Reed, are George E. Evans, Jr., Russell Harman, H. B. Jones, R. D. Jones, Harry LaViers, C. D. McDowell, Roland P. Price, Joseph Stras, William B. Sturgill, Dr. Frank C. Thomas, Cecil H. Underwood, R. V. Venable and B. W. Whitfield III.

Harvey M. Snook, comptroller of U. S. Steel's Tennessee Coal & Iron Div., has been made a director of the Birmingham Control of the Controllers Institute of America. Also named to its board was William C. Jones, controller, Alabama By-Products Corp., Birmingham. Others who have been named directors of Institute controls in their respective cities are Arthur J. Horning, secretary, Empire Hanna Coal Div., M. A. Hanna Co., Toronto, and Samuel N. Zagaria, controller, Truax-Traer Coal Co., Chicago. Established in 1931, the institute is a nonprofit management organization of controllers and finance officers from all lines of business.

- ONE COMPLETE UNIT
- ALL PARTS ON ONE BASE
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- 3 MODELS FROM 35 TO 75 T.P.H.

RIDGE AIRJIG Cuts Preparation Costs

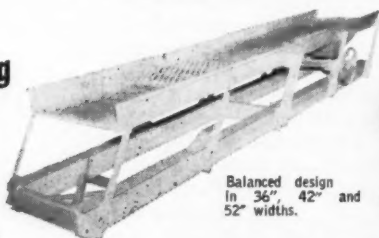


The Ridge Airjig combines efficiency with economy to give you the most practical, dry preparation of clean, marketable coal available. Separator, motors, blowers and controls are all mounted on one base . . . make the Ridge Airjig a complete, compact

unit ready for immediate operation when placed under surge bin. Perfectly balanced rotating parts eliminate need for expensive, permanent foundation structures. Operates with top efficiency even on feeds with up to 8% moisture.

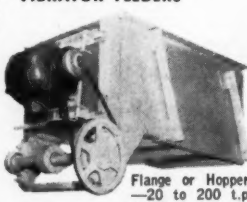
Other
Ridge Equipment
For Low Cost Handling
Of Coal . . .

RIDGE TANDEM
VIBRATOR SCREENS

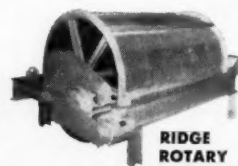


Balanced design
in 36", 42" and
52" widths.

RIDGE
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Flange or Hopper Types
—20 to 200 t.p.h. capacities.



RIDGE
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BREAKERS

6' to 9' diameters. 10' to 18' lengths. Center shaft or trunion design—50 to 500 t.p.h. feeds.

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to choose from—*

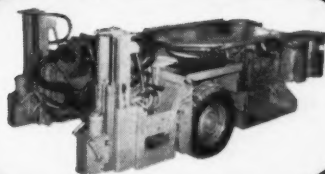
Fletcher
ROOF CONTROL DRILLS

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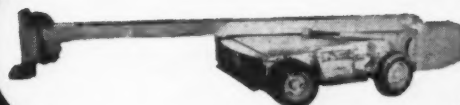
**EFFICIENT
STANDARD
ROOF DRILLS**



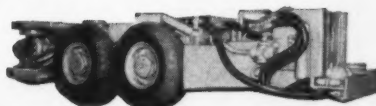
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**HIGH CAPACITY
SWINGING BOOM—
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**24" HIGH
LOW CRAWLER—
ROOF DRILLS**

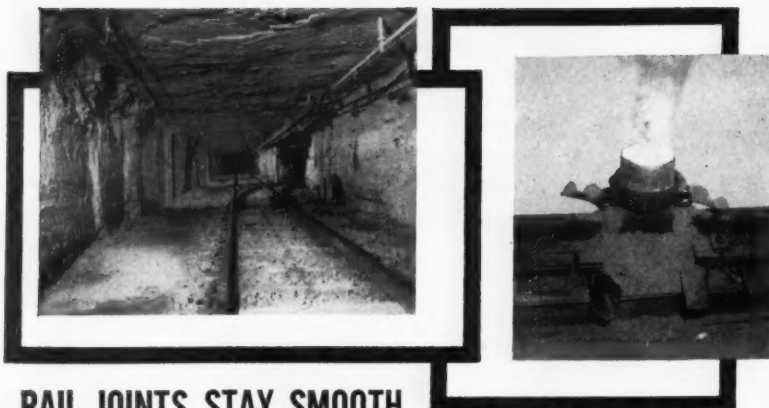


THE superior features found in Fletcher Roof Control Drills produced over the past ten years have been further refined in this new generation of machines. And, as always, Fletcher drills cost less to own and operate — and you have the special features you need for more capacity in your conditions. You would expect as much from equipment built by specialists in Roof Control equipment for over 10 years.

- Improved high-thrust mast feed—
with new "hoseless jacks"!
- Improved heavy-duty tram with
individual wheel drive!
- Greatly increased feed range in
both high and low models!
- Longer wearing, easily maintained
parts!

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RAIL JOINTS STAY SMOOTH and TROUBLE-FREE when THERMIT WELDED

Thermit Welds are rail-hard steel throughout. There are no areas of softer metal to wear or cup and cause pounding of rail ends under car and locomotive wheels. Joints stay smooth and trouble-free for the life of the rail.

Simplified, speedy welding procedure permits making a Thermit Weld in minutes — on either old rail or new. Only expendable materials are required — no equipment of any kind.

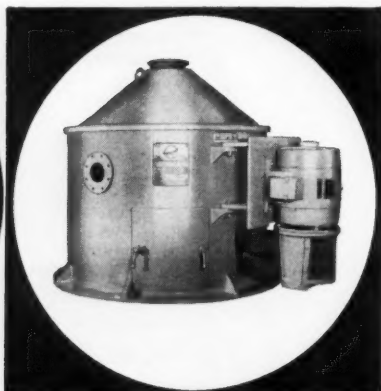
For more than twenty years, Thermit Rail Welding installations have been successfully helping coal mines reduce haulage track maintenance costs.

Write for data on the Thermit Self-Preheat Rail Weld—simplest of all rail welding methods.

THERMIT WELDING

Thermex Metallurgical, Inc., Lakehurst, New Jersey

THE C·M·I COMPACT 26



NEWEST ADDITION TO THE CMI LINE OF CONTINUOUS CENTRIFUGAL DRYERS

The all new CMI Compact 26 is the first compact dryer for moderate requirements; the first compact dryer specifically

made for a capacity of 20 tons per hour or less of coal or minerals; the first compact at a modest price.

Send for Bulletin 26 which contains complete information.

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NCA to Get Prior Notice Of Defense Fuel Changes

Representing a major step in retaining important coal tonnages threatened by proposed conversion to other fuels, the National Coal Association convinced the Department of Defense to notify the association of any plans to convert military heating plants from coal to other fuels.

The department agreed to this line of action after NCA offered its technical assistance in determining the most economical fuel selection course for every military installation.

Rep. Elizabeth Kee (D-W. Va.), who pushed the cause for NCA, said that many such installations switched from coal "on the basis of inaccurate information contained in studies of fuel prices and availability." It is expected that the department will realize monetary savings as a result of the agreement.

The coal industry received another boost when the Defense Dept. announced it is considering using American-produced anthracite coal and coke for U. S. bases in Europe. This study would determine the economic practicability of supplying about 720,000 tons of U. S. anthracite annually. However, no decision has yet been made.

U. S. Bituminous Enriches Canadian coals

Even though Canada's Cape Breton is coal rich, U. S. bituminous is being imported for use at Dominion Steel & Coal Corp.'s Sydney steelworks.

For almost a year the company has been testing a blend of 78% Cape Breton coal and 22% U. S. coal to produce metallurgical coke for its blast furnaces. The outcome has been an achievement in operating efficiencies not possible with the local coal alone. If results are as promising as small scale tests indicate, Dosco could use about 140,000 tons of U. S. coal annually.

Canada Studies Coal-In- Oil Transportation

Oilgram, a McGraw-Hill publication, hears that a pilot-plant study of coal-in-oil transportation by the Research Council of Alberta, Canada, has resulted in application for patent rights to the process involved and that a field trial will be conducted next summer in the Edmonton region.

The council initiated the study about 2 yr ago hoping to cut transportation costs with an eye to opening Eastern markets. Evidently taking into account progress in plans for pipelining solids, the Alberta Government amended its

pipeline act last spring. The new section states that "Provisions of the act which apply to oil lines apply also to mineral lines subject to such alternations and variations as may be made."

Oil and Coal Studied for Effect of Import Controls

To determine, among other things, whether the import control program is weakening the domestic energy industry and fostering monopoly control, a study is being undertaken by the House Small Business subcommittee, headed by Rep. Tom Steed (D-Okla.).

Several hundred questionnaires were mailed to all segments of the oil and coal industries with a request for replies by Sept. 6. After replies are in and analyzed, the Steed committee expects to set dates for public hearings, probably late in September or in October.

The coal industry is asked about production from 1950 on, and production losses attributed to importation of residual oil. Questions to oil companies seek information on the number of wells drilled since 1956, quantity of oil refined, amount of profits and losses and effects of the import controls.

USBM Proposes Tests for Gas Monitors in Mines

The Bureau of Mines is proposing new standards under which it would test and approve for use in underground coal mines automatic "monitoring" systems for guarding against dangerous concentrations of methane.

According to the bureau, a "methane-monitoring system" is an assembly of equipment that will detect concentrations of this gas before they build up to potentially explosive proportions. Such a system also incorporates devices that warn workers of methane accumulations and then automatically shut off all electrically-powered equipment in the affected part of the mine.

Office of Coal Research Awards First Contract

The Office of Coal Research took an initial step toward achieving its purpose of increasing coal markets by awarding a \$139,000 contract to Booz-Allen & Hamilton, Chicago, Ill.

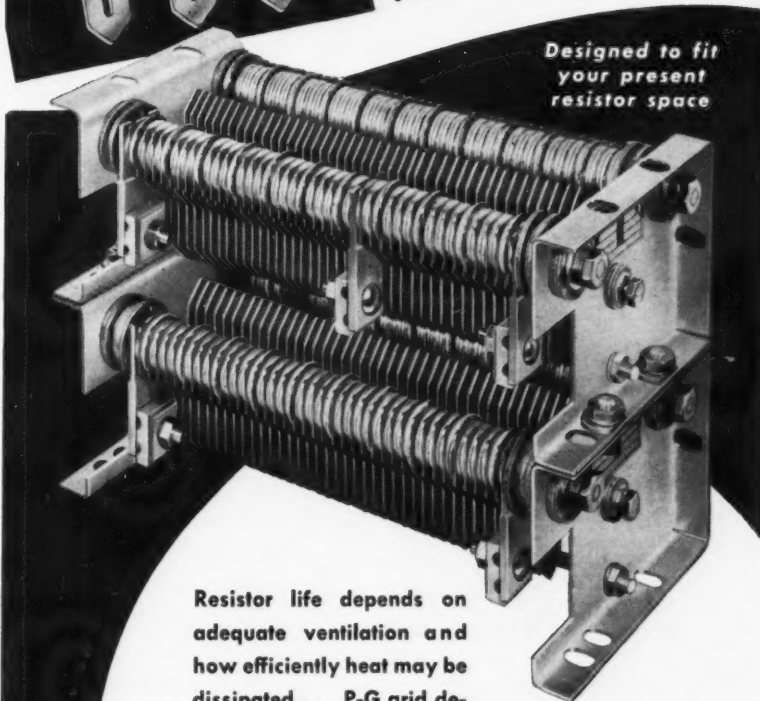
The contract calls for a study designed to identify new products which would expand present coal markets and generate new ones. Results of this study are expected to be available not later than Mar. 31, 1962.

More than 100 contract proposals are now being evaluated by the office and additional contracts will be issued in the near future.

Resistor life depends on adequate ventilation...



Patented  Grid Design assures maximum ventilation



Designed to fit your present resistor space

Resistor life depends on adequate ventilation and how efficiently heat may be dissipated . . . P-G grid design equalizes the amount of air space surrounding each leg or loop to obtain even heat throughout the grid area. (Note illustration.) . . . Since heat is rapidly and evenly dissipated, hot spots fail to develop and longer resistor life is assured . . . For a nonbreakable resistor (only steel and mica used) specify P-G on your next application.

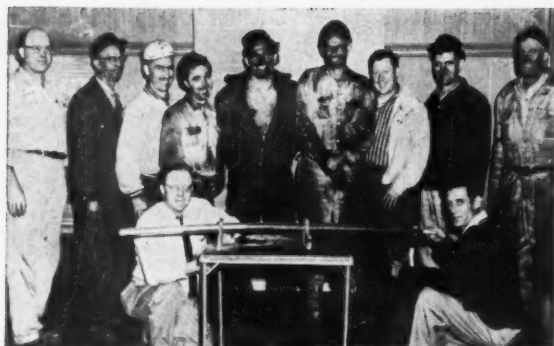


The Nonbreakable Steel Grid Resistor

THE **POST-GLOVER** ELECTRIC COMPANY

OFFICE and FACTORY—Kenton Lands Road, Erlanger, Kentucky

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Milburn Men Train for Safety

ATTENDING A USBM ACCIDENT-PREVENTION CLASS held at Milburn Colliery Co.'s Nos. 3 and 4 mines, Milburn, W. Va., participants watch a demonstration of blasting procedures. Lloyd G. Fitzgerald (kneeling, left) instructs the class with Enoch Wriston, shot-firer, assisting in the demonstration. Participants include Leroy Britt, superintendent (left); L. T. Stanley, preparation-plant foreman; R. E. Hubbard, purchasing agent; Glenn Calhoun, continuous-miner operator; Art Kinley, Thomas Neeley and Charlie Couch, section foremen; J. B. Miller, chief electrician; and S. G. Couch, general mine foreman.

Sahara Coal Co. Awards Forestry Scholarships

Thirteen Southern Illinois University forestry students have been selected to receive Sahara Coal Co. scholarship awards for the 1961-62 school year.

Ten of the scholarships will come from a new \$9,000 grant, made by the coal firm last April, to be distributed over a 4-yr period to promising students interested in forestry careers. The other three are the remaining unclaimed scholarships from the company's \$9,600 grant to SIU in 1957 for a similar program. Each cash grant totals \$225, one-third being distributed to the students each term during the year.

Electric Heating Conference

Electrical World, a McGraw-Hill publication, will hold its Fifth Electric Heating Conference Sept. 25-26 at the Sheraton Park Hotel, Washington, D.C.

Numerous representatives from all segments of the industry have been chosen to speak at the two-day conference. At the close of the second day, eight roundtables will be set up to discuss the topics

talked about during the first day and a half. These topics include the modernization market, mass builder market, commercial market, distribution policies, gas and other competition, equipment development, future developments and insulation.

Scheduled as luncheon speaker on Sept. 25 is Interior Secretary Stewart L. Udall. His subject is "What Will the National Policy on Fuels Be?" On the following day, during luncheon, a member of the gas industry will speak on developments in the gas-heating field, such as, the gas turbine.

UMWA Welfare & Retirement Fund Annual Report

According to its annual report, the United Mine Workers of America Welfare and Retirement Fund spent \$133,132,171 in the fiscal year ending June 30, 1961. Total income amounted to \$116,692,784, of which \$114,492,539 was royalty payments. As of June 30, 1961, the unexpended balance was reduced to \$99,832,118.

Of the total expenditures, \$128,699,679, or 96.7%, were benefit payments aiding 201,051 beneficiaries throughout all bitu-

minous coal-mining states. A total of 4,660 miners were authorized pensions during the fiscal year and 66,759 retired miners were receiving monthly pension payments.

Trustees of the fund are John L. Lewis, chairman and chief executive officer; Henry G. Schmidt, president, North American Coal Corp.; and Josephine Roche, director of the fund.

Gas Firm Calls Volume Coal Rates Unlawful

For the first time a court ruling is being sought upon the lawfulness of annual volume rates on coal.

In an action filed in July in U. S. District Court for the District of Delaware, the North Carolina Natural Gas Corp. seeks to have set aside an ICC order upholding volume rates on bituminous fine coal from southern mines to plant sites of the Carolina Power & Light Co. The complaint alleges that annual volume rates are unlawfully discriminatory by their very nature, that they violate Sec. 2 of the I. C. Act and Sec. 1 of the Elkins Act.

The ICC order denies the gas company's petition for reconsideration because "sufficient and material grounds have not been presented to warrant a

New Orders Forecast

Capital goods manufacturers cooperating in the quarterly McGraw-Hill Machinery New Orders Forecast now predict their new orders will continue to rise steadily through the remainder of this year and on into 1962. The current forecast of 188 (1950=100) for the second quarter of next year is an all-time high for machinery orders. The highest previous quarterly average was 180, attained only twice in the past 12 yr.

Firms in all six nonelectrical-machinery categories predict gains in new order bookings in the second quarter of 1962 compared with the like period this year. Makers of metal-working machinery expect an 11% increase and pump and compressor builders predict a 4% gain.

Machinery New Orders Forecast

(1950 = 100)

	Total Machinery		Pumps & Compressors	Engines & Turbines	Construction & Mining Machinery	Metal-working Machinery	Office Machinery	Other Industrial Machinery
	Seasonally Adjusted	Unadjusted						
1960								
I	169	177	327	161	193	168	220	154
II	180	184	321	180	197	175	227	161
III	176	168	296	139	159	176	216	149
IV	162	158	303	128	138	179	221	136
1961								
I	165	173	331	134	157	212	242	145
II	176	181	296	137	164	223	243	159
III*	179	171	276	121	151	191	246	156
IV*	180	175	281	130	144	196	264	159
1962								
I*	182	190	299	140	170	230	270	169
II*	188	193	309	148	167	248	271	170

*Forecast made in mid-July, 1961.

Source: McGraw-Hill Department of Economics.



Production lost by accidents like this can cost more than the original cable. The exceptional crush-resistance of Anaconda flat shuttle-car cable repays your cable investment many times over by assuring minimum downtime.

Even if this should happen, flat Anaconda shuttle-car cable stays on the job

When a machine runs over Anaconda *flat* A-C or D-C shuttle-car cable, its weight is spread evenly over all the conductors, instead of being concentrated at a few points, as it is with round cable. The conductors won't shift under the jacket, because the insulation is shaped to fit the jacket exactly—D-shaped on the outside conductors and square on the center conductors.

The flat shape is safer for personnel, too, because it won't roll when stepped upon.

Inside, nylon breaker strips separate the insulated conductors, for extra crush resistance and less chance of conductor-to-conductor shorts. Tough Neoprene insulation, color-coded for easy identification, reduces conductor cutting action to a minimum. A specially compounded Neoprene jacket, which has proved its

abrasion resistance through years of service, is reinforced by a rugged nylon web. For A-C service special grounding conductor construction lets you use ground trip relay systems.

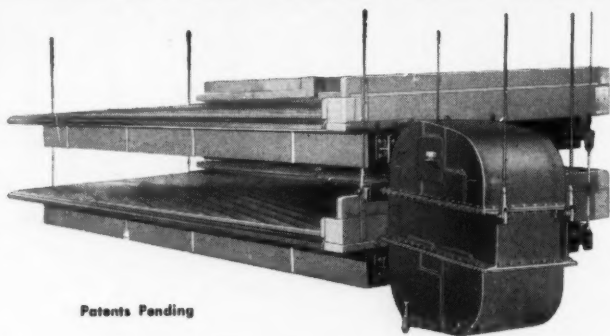
For more information about Anaconda flat shuttle-car cable for A-C or D-C systems, contact the Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York, Department EFL-1-CA.

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Operators Agree The **CONCENCO**® 77 Table Cuts Washing Cost

Since the DoubleDuty CONCENCO 77 twin deck coal washing table was first introduced five years ago, almost every important new preparation plant has included double-deck CONCENCO 77 tables . . . as many as thirty-two in a single installation.

The reason for this overwhelming acceptance is the sensational and obvious economy of double deck operation. Each deck is identical in size and performing efficiency to the famous SuperDuty® single deck table. Twice as much coal is therefore prepared in the same unit of floor area, enabling the user long to postpone new building construction.

Send for Bulletin 77 to get complete information.



CONCENCO Feed Distributor

While unexcelled for feeding coal washing tables, the CONCENCO Feed Distributor effectively provides an accurate splitting of feed into any desired number and proportion of parts to feed circuits or machines in battery for their greater overall efficiency. It is a heavily fabricated all steel machine with motor drive requiring 1 h.p. or less in operation.



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conclusion, without hearing, that the tariffs assailed herein are unlawful, per se." This denial, according to ICC, is based "upon consideration of the decision of this Commission in Coal from Kentucky, Virginia and West Virginia to Virginia ("Vepco Case") 308 ICC 99 and Coal to New York Harbor Area ("Consol-Ed Case"), 211 ICC 353."

ORA Cited for Strip-Mine Reclamation

For its meritorious efforts in reclamation work and sponsorship of research projects dealing with reclamation, the Ohio Reclamation Association received the 1961 Industry award issued by the Ohio Conservation Congress.

The association reclaimed over 50,000 acres of strip-mined lands, planted an average of 2,500,000 trees each year, seeded grasses and legumes on up to 5,000 acres, and planted some 30,000 shrubbery species.

Organized in 1945, the association represents about 100 companies engaged in strip mining of coal in Ohio.

Preparation Facilities

Eastern Gas & Fuel Associates, Melcroft, Pa.—Contract closed with Ridge Equipment Co. for 75 tph Ridge airjig to handle ¾x0 coal.

Koal Kreek Coal Co., Cedar City, Utah — Contract closed with Ridge Equipment Co. for 55 tph Ridge airjig to handle ¾x0 coal.

Allied Die & Chemical Corp., Semet-Solvay Div., Harewood Plant, Harewood, W. Va. — Contract closed with Deister Concentrator Co., Inc. for two Concenco "77" coal washing tables to handle ¾x0 coal and two Concenco two-way splitters for feed distribution to tables.

Clinchfield Coal Co., Moss Mine No. 1, Clinchfield, Va. — Contract closed with Link-Belt Co. for fine-coal cleaning equipment including froth-flotation filtering to process ¾x0 at 300 tph.


Mines, Companies

As part of its capital expenditure program, Peabody Coal Co. has begun construction of a new strip mine 8 mi north-east of Columbia, Mo. Scheduled for completion in the fall of 1962, the new "Mark Twain" mine will produce be-



many mine locomotive RENEWAL PARTS may

**LOOK ALIKE
FEEL ALIKE
WEIGH ALIKE
FIT ALIKE**

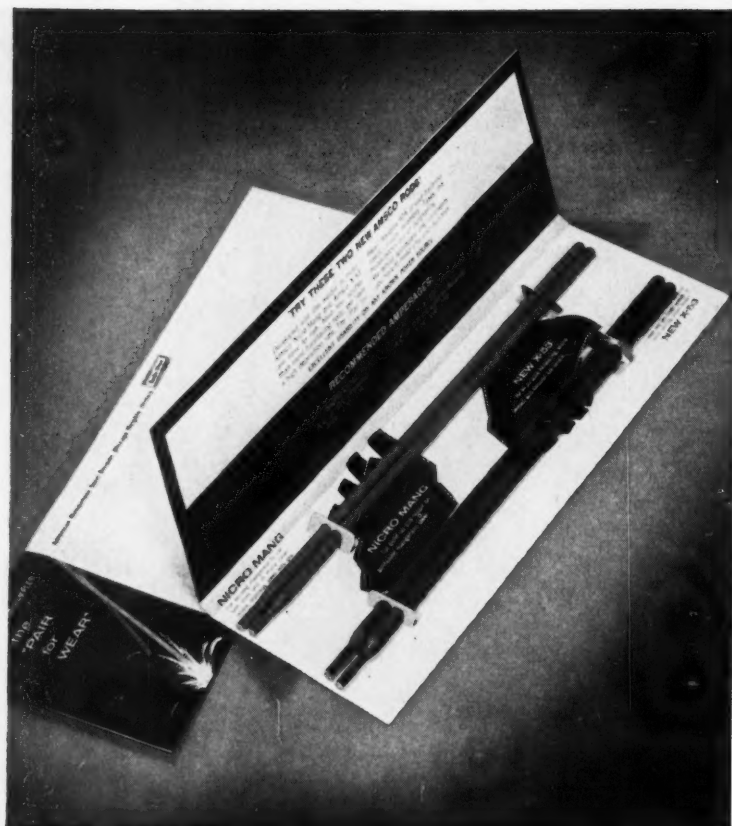


BUT they don't perform alike. Only General Electric certified Renewal Parts are designed to maintain the perfect balance of the entire mechanical and electrical system of a General Electric mine locomotive. System design and craftsmanship assure that each part does its job efficiently and effectively . . . and makes a positive contribution to every related part in the system. Since each G-E part is made specifically for General Electric mine locomotives, there is no need for design compromise. Proper system performance will save your maintenance dollars.

For information on parts and maintenance problems contact your local G-E sales representative or write to General Electric Company—Locomotive & Car Equipment Department—Building 12—Erie, Pa. 121-05

GENERAL  ELECTRIC





Test the AMSCO "Pair for Wear"—FREE!

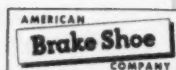
Let your welder try these two Amsco rods that will handle 90% of your manganese and hardfacing welding.

Try the "Pair for Wear"—Amsco Nicro Mang* and Amsco X-53—and see how you can cut your welding electrode inventory.

Nicro Mang, the 14% manganese electrode that welders like to use, will do all your manganese steel build-up and repair. If you're using stainless rod for welding manganese to carbon steel, Nicro Mang can save you dollars.

New X-53 is a composite electrode for all-purpose hardfacing. It goes down fast, is easy to run, and gives superior service life to parts subject to impact and abrasion.

See your Amsco distributor or write direct for your free "Pair for Wear" sample kit and start to save today.



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tween 400,000 and 500,000 tons per year.

Peabody also announced that the mine in western Kentucky which will serve the company's, 4,000,000-ton-per-year long-term contract has been officially named the "Sinclair Mine."

Emerging from the red of last year, Glen Alden Corp. chalked up a considerable net profit on sales and revenues for the first 6 mo of 1961, largely as a result of disposing of its Mathes division, manufacturer of air conditioners.

Representing 21c per common share, the net profit totaled \$1,173,000 on sales and revenues of \$43,386,000 as compared to a net loss of \$1,364,000 on \$44,728,000 for the comparable period of 1960.

The Mathes division was sold May 31, retroactive to the first of the year, to Republic Transcon Industries.

Utilization

In spite of likely competition from a proposed hydroelectric power plant, Pacific Power & Light Co. has begun coal explorations on its properties in southwest Oregon adjacent to the proposed hydro plant site.

Plans for a future steam-electric plant to serve southwest Oregon prompted Pacific Power to obtain mining rights to the 5,000 acres in the Squaw Basin area just after similar explorations in 1956 and 1957 mapped two veins of sub-bituminous coal.

The power company proposing the hydroelectric development has a license application pending before the Federal Power Commission for the two-dam, \$23-million project which would develop 77,000 kw.

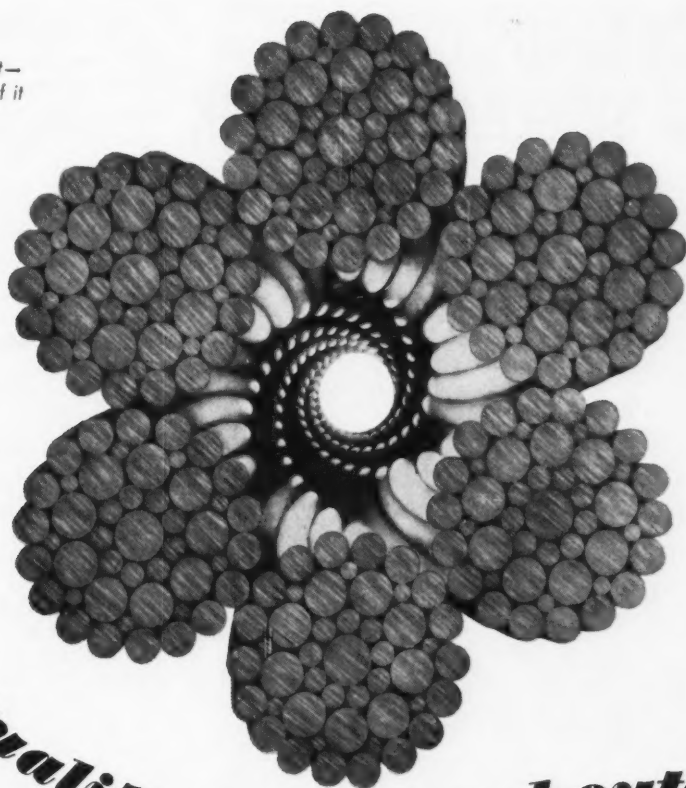
Electric power consumers can anticipate even further price advantages thanks to another world-record achievement in squeezing more electricity out of coal. This accomplishment goes to American Electric Power's Clinch River plant for producing 1 kwhr from less than 7/10 of a lb of coal. Formerly it took 9/10 of a lb of coal to generate 1 kwhr. Credit the unending technological war for these advances which have come a long way since the time the ratio was 3 lb of coal for 1 kwhr back in 1920.

Transportation

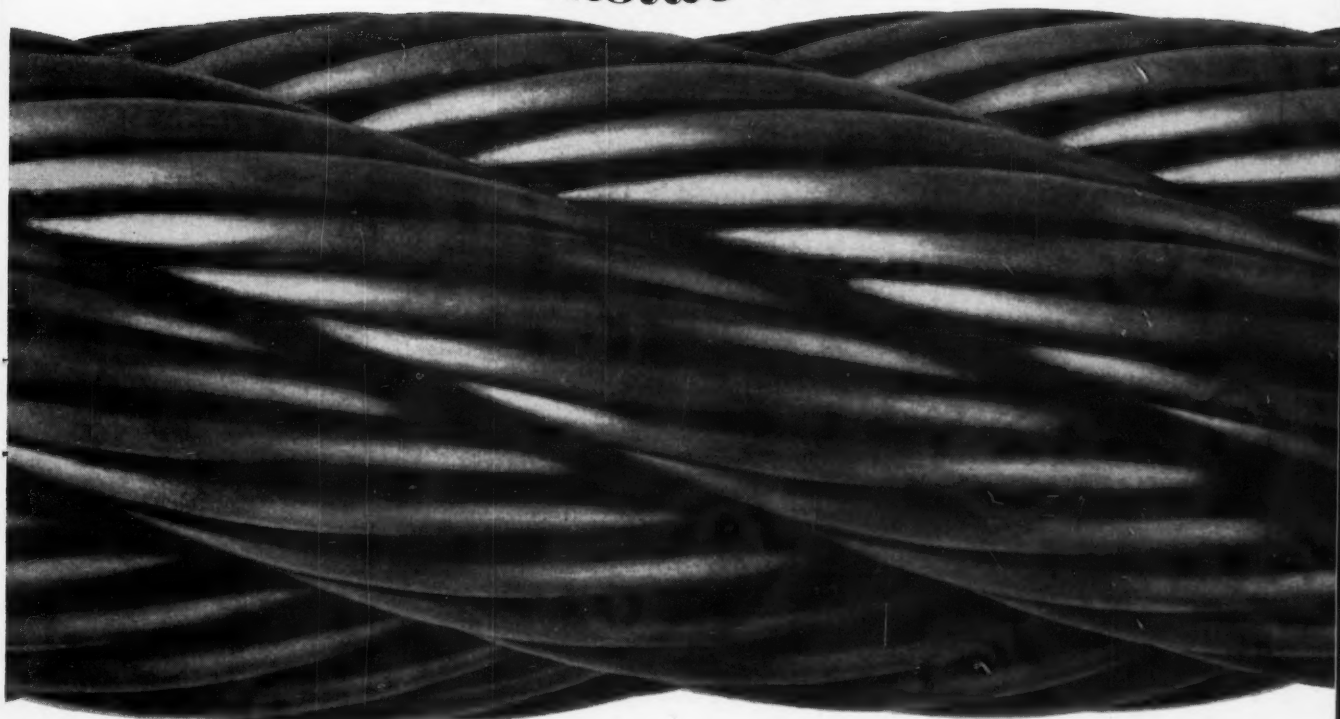
Eastern rail officials have proposed reduced steam-coal rates on a 10-yr annual volume basis to plant sites of the Detroit Edison Co.

The proposal calls for reductions of 37½¢ per net ton on the first 6 million

We put a lot of work into it—
You get a lot of work out of it



Quality inside and outside



Two important angles on wire rope savings: the quality and uniformity Roebbling builds all the way through Royal Blue Wire Rope. They give you a big, extra margin of service through every kind of wear and tear — and combine to make extra

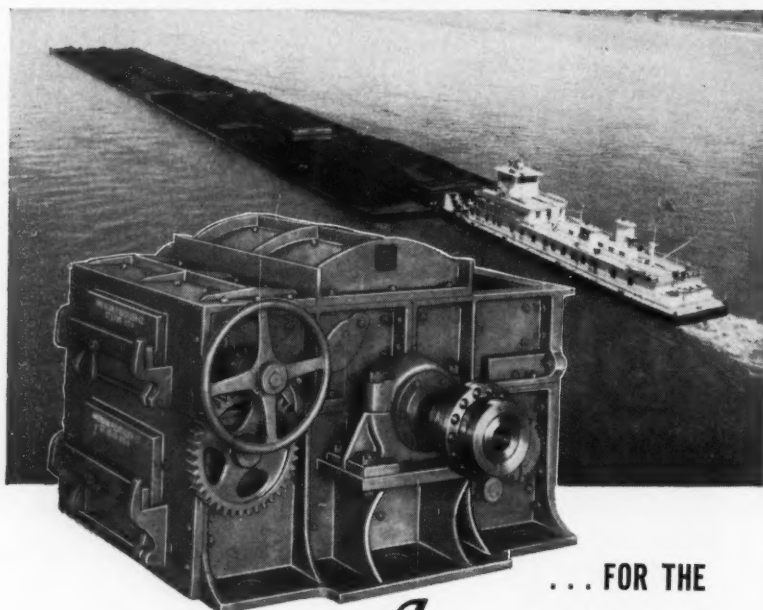
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12 BARGE LOADS OF COAL IS BUT A SINGLE DAY'S WORK



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... and capacity for work is but one of the advantages

The American Coal Crusher will keep on operating at high performance for many years — just like old man river.

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Patented manganese steel shredder rings, reversible for double life, manganese steel liners to protect the crushing chamber, and strong ribbed steel frames are among the construction features that give American Crushers the ruggedness that mean savings to every owner.

Figure American Coal Crushers in your cost analysis when you figure ways to better profits.

Write for Bulletin on American AC Coal Crushers



tons delivered annually and 50¢ per net ton thereafter, subject to cumulative annual minimum tonnages. These tonnages would be determined by estimated total requirements of the consignee for a 10-yr period beginning Jan. 1, 1962. From the effective date of the tariff to the end of 1961, rates would be reduced 37½¢ per net ton subject to a minimum aggregate tonnage determined on the basis of the consignee's estimated consumption for the rest of the year.

Specific destinations involved are Detroit, Marysville, River Rouge, St. Clair and Trenton, Mich.

Safety

In a special national campaign to prevent coal mine roof-fall injuries, Bell & Zoller Coal Co., Chicago, received an achievement award presented by the National Safety Council covering the calendar year 1960 when the campaign was conducted.

Cited by the council were Bell & Zoller's Mine No. 3 in Williamson County, Ill.; Murdock Mine in Douglas County, Ill.; and Spartan Mine in Randolph County, Ill.

Bethlehem Mines Corp. teams captured first and second prizes at the 19th annual first aid meet held July 22 at J. S. Mack Community Center Fairgrounds, Indiana, Pa. Top victory, copied by Mine 32, carried a \$350 cash prize and a plaque presented by Mine Safety Appliances Co. Finishing second, Mine 73 split \$210 and received a trophy.

New Books

Illinois Coal Reserves

Strippable Coal Reserves of Illinois; Part 3 — Madison, Macoupin, Jersey, Greene, Scott, Morgan and Cass Counties, by W. H. Smith, is the first extensive report on strippable coal in west central Illinois. It is concerned chiefly with reserves on the Nos. 2 and 6 coals. Maps show outcrops, thickness of overburden, mines and average thickness of coal Circular 311. Illinois State Geological Survey, Urbana, Ill.

Wyoming Coal

Geology and Coal Resources of the Buffalo-Lake De Smet Area, Johnson and Sheridan Counties, Wyoming, describes the sedimentary rocks and reserves of coal in part of the Bighorn mountains and the adjacent west side of the Powder River basin. 148 pp. text plus 23 plates. 6x9-in; paper. Geological Survey Bulletin 1078, Superintendent of Documents, U. S.

Government Printing Office, Washington 25, D. C.

Describing and Sampling Coal

Field Description and Sampling of Coal Beds, by James Schopf summarizes descriptive coal terms for field use, and procedures for coal description, as well provides helpful notes on coal sampling. *Geological Survey Bulletin 1111B*. \$1, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

ASTM Standards

Supplements to Book of ASTM Standards. The 1960 supplements bring up to date the corresponding 10 parts of the 1958 book of Standards and 1959 Supplement. \$4 each part, \$40 per set. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

Equipment Approvals

Long-Airdox Co.—Type 188 loading machine; one motor, 40-hp, 230-V, DC. Approval 2F-1664, July 7.

Galis Electric & Machine Co.—Model 300-B roof-drilling machine with integral dust-collecting system; one motor, 30-hp, 440-V, AC. Approvals 2F-1665A and 258-93, July 10.

Southern Research Institute—Particle dust counter with self-contained direct-current power supply. Approval 2F-1666, July 14.

Galis Electric & Machine Co.—Model 700-T2 belt feeder; two motors, each 5-hp, 250-V, DC. Approval 2F-1667, July 14.

Joy Mfg. Co.—Type 15SC1PHH/PXHH-I shuttle car; five motors, two 40-hp, two 20-hp and one 25-hp, 415-V, AC. Approval 2F-1668A, July 18.

Long-Airdox Co.—Type D-9457 battery-powered utility truck; one motor 15-hp, 96-V, DC. Approval 2F-1669, July 19.

Galis Electric & Machine Co.—Model 300-A roof-drilling machine with integral dust-collecting system; one motor, 30-hp, 550-V, DC. Approvals 2F-1491A and 258-89, July 25. [Approval 2F-1491 covering the 250-V, DC Model 300-A roof-drilling machine was issued to Galis Electric & Machine Co. on Aug. 12, 1959.]

Joy Mfg. Co.—Model 20RC4-2 diesel-mechanical shuttle car with Hercules Model D-426 twin diesel engines, for use in noncoal mines. Approval 24-42, July 27.

Ensign Electric & Mfg. Co.—Distribution box; four-circuit, 440-V, AC. Approval 2F-1670A, July 28.



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BY CATERPILLAR

Here's a new profitable combination



Caterpillar-powered Gardner-Denver "Rota-Screw" portable air compressors reduce maintenance to lowest costs ever

Here is a major breakthrough in performance which means new low costs to users of compressed air. Gone are rotary blades or pistons. A helical "Rota-Screw" now eliminates blade chatter, vibration and whine. Quietness, pulsation-free air and minimum maintenance are the results.

Gardner-Denver's new SP900, a 900 CFM machine, is powered, as standard equipment, by the Cat D343 Diesel Engine. The SP600, a 600 CFM machine, is standard with the Cat D333 Diesel Engine. You get four-cycle design with full-stroke efficiency, plus full-length, watercooled cylinder liners for efficient cooling. Aluminum alloy pistons give low reciprocating weight, valve rotators distribute valve face wear and low-friction aluminum alloy bearings are known for superior strength and load carrying ability.

You'll like the Cat-powered Gardner-Denver line for the Caterpillar fuel system that provides "constant power" with no adjustments. Low-cost, high BTU fuels, such as

household furnace oil, can be used instead of premium-cost No. 1 diesel fuel. Single orifice injectors and precombustion chamber design prevent fouling, even during long periods of idling between air demands. Electric glow plugs and ether starting arrangement are standard for quick, sure starts at below zero temperatures. Compressors are tested for a temperature range of -40° F to 115° F.

Compressor service is available through a world-wide network of Gardner-Denver service points. In the U. S. alone there are over 5100 Caterpillar Dealer field service trucks on 24-hour-a-day call for engine service.

For more information on this new concept in compressors, write to the Gardner-Denver Company, Quincy, Illinois. Your nearby Caterpillar Dealer can tell you more about Cat Diesel and Natural Gas Engine Power for every application requiring from 50 to 950 HP, or write to Department 516, Engine Division, Caterpillar Tractor Co.

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Devoted to the Operating, Technical and Business Problems of
The Coal-Mining Industry



SEPTEMBER, 1961

IVAN A. GIVEN, EDITOR

The Real Job

Prices for competitive fuels at the point of consumption deserve much-keener study than they apparently have received. When natural gas sells in Connecticut and New Jersey for over \$2 per thousand for residential use, and as high as \$0.90 or better for industrial fuel, and when regular-grade gasoline goes for 12c a gallon or better at terminals in Chicago, Oklahoma and Oil City, Pa., it would seem that opportunity should be knocking.

The opportunities could come from (1) direct competition through the active promotion of modern commercial and industrial burning installations using coal, and (2) through the construction of plants for making gasoline and gas from coal. The competitive-price situation, as noted, is right or soon may be in some areas, while cuts in transportation charges and a stable mine price should improve coal's advantage very, very materially in the next few years in these areas and in others as well.

Answers? With such a clear and growing advantage in prices at consumption points, one answer boils down to a real selling job—one matching or exceeding the cost-cutting job already done. A second is active development of processes and plants for making synthetic liquid fuels and gas.

Tomorrow's Mines

The bituminous industry could very well be turning out 625 million tons or more in 1970. Though it may seem startling, this figure is the result of the analysis that *Coal Age* has made as a part of the preparations for its October Golden Anniversary Issue. The 625-million-ton total is one that the industry could attain if it takes full advantage of the possibilities.

If such a total is reached, it follows immediately that a lot of new mining capacity will be needed. In fact, a lot will be needed merely to replace present facilities now nearing exhaustion. A major increase in development of new mines therefore is in the cards for the near future. The process, in fact, has already started.

The mine of 1970—or perhaps even 1965—may be an amazingly simple thing. If single continuous-mining units can average 1,500 to 2,000 tons per shift—which they undoubtedly will only a few years hence—and can be operated three shifts a day—again to be expected as standard practice—one such unit will constitute the mining facilities for an operation producing a million tons or better a year. Things definitely will be different.



SOURCE of coal is deep open-pit mines like this one which are worked to a depth of 750 ft in seven planned steps.

High-quality coal, modern preparation equipment and well-designed truck-loading facilities are outstanding marks of new plant operated by Greenwood Mining Co., near Tamaqua, Pa. Source of coal is famed Greenwood open-pit mine.

Anthracite in Panther Valley

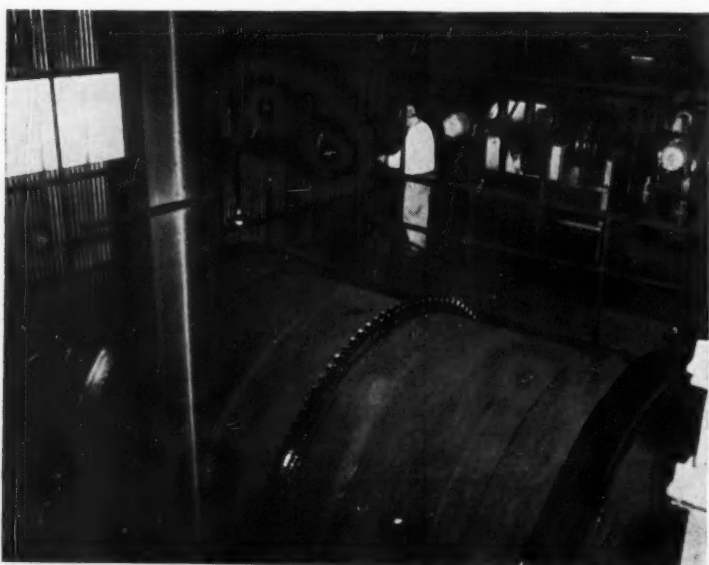
IN THE PANTHER VALLEY of eastern Pennsylvania, the pioneer mining center of the anthracite region dating back to 1820, a turn-about development took place in 1960 that is surprising in view of the hard-coal industry's fight for survival. Coaldale, the last of five giant

anthracite collieries in this area formerly operated by Lehigh Navigation Coal Co., discontinued operations in February, 1960. It seemed at the time that anthracite mining might be ending in the Panther Valley, rendering a serious economic blow to the area.

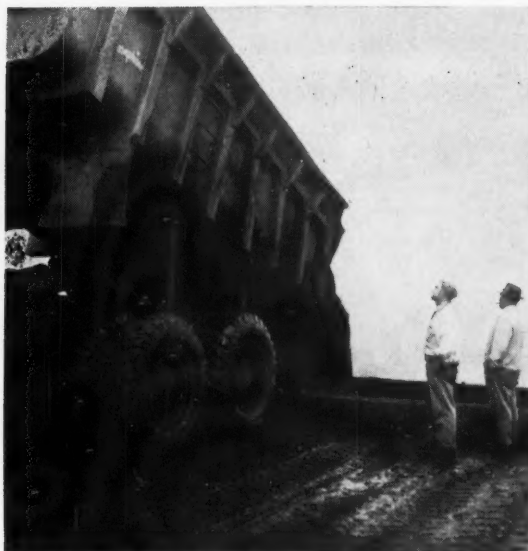
But that was not the opinion of the five Fauzio brothers—William, Frank (Patty), James, Paul and Patsy—of Nesquehoning, Pa., the town at the eastern terminus of the Panther Valley coal measures. The five brothers had achieved outstanding success in the strip-mine contracting business for anthracite producers in the Lehigh region. Having been born and reared in the Panther Valley and associated with hard-coal mining all their lives, and having faith in the future of the product, they decided that a strong successful comeback could be made if production and service were tailored to meet specific market requirements.

In the face of great odds they pooled their resources and ingenuity to embark on a new mining and preparation venture named Greenwood Mining Co. They leased from Lehigh Coal & Navigation Co. all the Panther Valley coal lands, comprising 8,055 acres and containing reserves estimated in excess of 300,000,000 tons of inherently low-volatile, hard Lehigh coal.

They built a modern heavy-media plant, worth \$1½ million, at Tamaqua, Pa. This location was selected because of its proximity of the richest veins on the property, its ease of



LARGEST heavy-media drum in the anthracite coal industry, a 12x20-ft dual-gravity unit, is one of the outstanding features of new Greenwood Breaker.



JAMES FAUZIO (right), president, Greenwood Mining Co., and his son **Joseph Fauzio**, secretary, check raw-coal feed.



HOPPER feeds into precleaning plant for picking and crushing, then coal is conveyed on 48-in belt to main plant.

Stages a Comeback

access to truckers and its solid underpinning. The new plant is on the site formerly occupied by Tamaqua breaker of Lehigh Navigation Coal Co., under which solid pillars had been left in place.

This was in April, 1960. Veteran coalmen of the area were skeptical of Fauzios' plans to have the new plant completed and producing coal by October, 1960, but they were overlooking the dogged determination of these men who have an impressive record of achievement.

Ground was broken, and by the beginning of June, 1960, the foundations had been poured. The flow-sheet was planned in cooperation with engineers of Wemco Div., Western Machinery Co., and construction contract was let to D. & K. Construction Co., McConnellsville, Ohio. The structure was ready by the beginning of October. After a series of trial runs and adjustments in controls, full-scale production began Oct. 24, 1960, to climax a remarkable feat in creating a plant of this size with a capacity of 5,500 tpd.

Heavy Media Drum, Cone

The outstanding piece of equipment in the Greenwood pushbutton

breaker (cleaning plants in the anthracite region are known as breakers) is a 12x20-ft Wemco drum separator, the largest such unit in use in the coal industry. This installation, specially built by Western Machinery Co., features a two-compartment drum which provides a dual gravity separation of the Egg, Stove, Nut and Pea sizes (plus $\frac{1}{16}$ in). Raw coal enters the first compartment, containing a magnetite-water bath of low specific gravity, where a separation of true coal is made. Sink material from the first compartment is lifted to an inside-drum chute leading to the second compartment. A bath of higher gravity in the second compartment separates a middlings product (float) from final refuse (sink). Main advantages of this dual-gravity system are (1) effective, controllable separation and (2) maximum possible yield from the input to the plant.

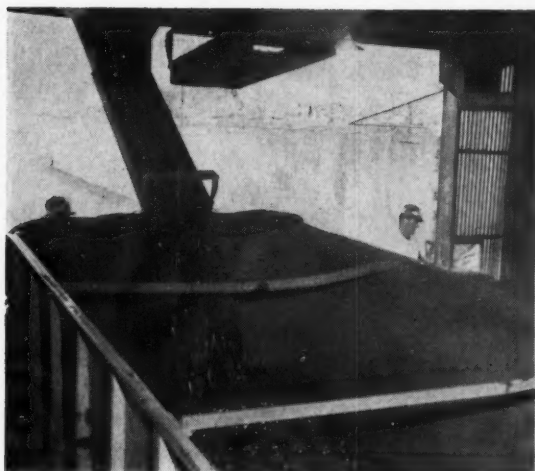
The accompanying flowsheet shows how the minus $\frac{1}{16}$ material is removed from the stream of raw coal on a pair of vibrating screens ahead of the drum separator. The minus $\frac{3}{32}$ -in material is removed on a set of sizing shakers, then the $\frac{1}{16}$ x $\frac{3}{32}$ raw coal is fed to a 14-ft Wemco heavy-media cone. This

spread of sizes in anthracite includes Buck No. 1, Rice and Barley coal. Feed to the cone also includes the crushed middlings from the drum separator.

Of particular interest is the treatment of refuse from the cone on a double-deck vibrator, the top deck of which isolates the refuse in the Buck No. 1 and Rice sizes. This carbonaceous waste is hauled to a nearby plant to be converted into Lelite, a lightweight aggregate. The excess steam from the conversion process is returned to the Greenwood plant to provide space heat and snow-melting heat under the paved exit road leaving the plant.

The minus $\frac{3}{32}$ -in raw coal is sized on launder screens to provide Buck No. 4 feed to a Wilmot Hydrotator and Buck No. 5 feed to a Wilmot Hydrotator - Classifier. Underflow from these processes is impounded at present and will be cleaned later as Buck No. 6 in froth-flotation equipment.

A recognition of the increasing proportion of anthracite now being trucked to market is reflected in the design of the plant, including the layout and construction of the loading pockets, the installation of dual truck scales for rapid weigh-in and weigh-



LOADING CHUTES from all-welded clean-coal pockets are lowered into truck to preserve coal sizing.



FRANK (PATTY) FAUZIO (left), president, Greenwood Stripping Co., and brother James, direct operations.

drain of free moisture. The room is equipped with vending machines for snacks, soups, coffee and so on. The object is to make Greenwood a good place to do business. Not the least of the advantages of the new facility is its proximity to truck highways, including the northeast extension of the Pennsylvania Turnpike and U. S. Route 22 across Pennsylvania and through New Jersey to New York City.

Quality Control

Constant checks on heavy-media gravity and coal quality are maintained as the coal flows through the breaker. Systematic analyses of



EVERY RAILROAD CAR is carefully sampled by ASTM 9-point method.



QUALITY TESTS are run by William McMichael, veteran coal analyst.



LARGE SCREEN AREA reduces undersize in products. For example, there is less than 1% undersize in Greenwood nut.



CONTROL CENTER is inspected by Frank Voyack (left), foreman, and David D. Morgan, preparation manager.



THICKNESS of coal is shown in this photo of one of the loading points.



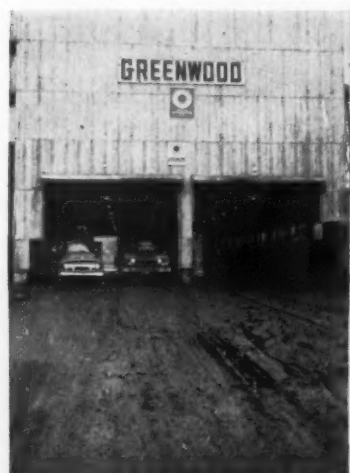
OPEN-PIT OPERATIONS consist of removing overburden in benches and hauling all material out of the pit. Main excavators are 6½-yd shovels.



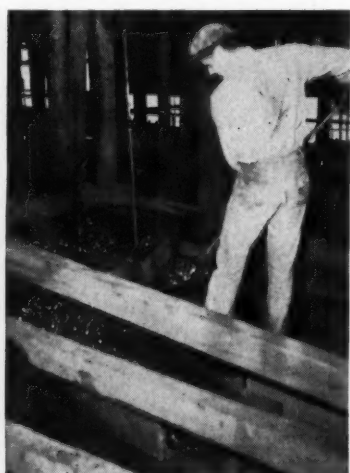
HAULAGE FLEET includes 55 trucks of 22-ton capacity. In addition, the project employs 25 service vehicles.



TRUCK-SALES STAFF includes manager and four weighmasters to give efficient service to truck trade.



FOUR LOADING LANES are available to provide faster service.

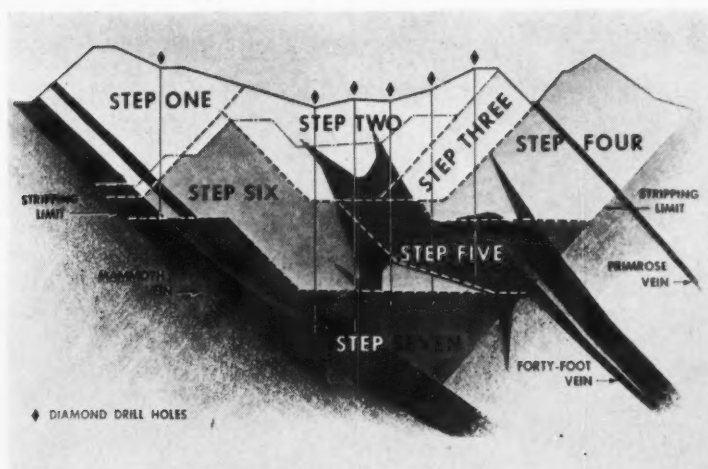


SAMPLING and testing for size and gravity are done at frequent intervals.

truck-loaded coal are made and every railroad car is subjected to the ASTM 9-point method of car sampling. Any coal that does not measure up to the company's stringent standards is condemned and rerouted through the breaker. Uniformity in size and quality are paramount, since the company's hopes for a successful enterprise are based upon these factors.

The coal from this particular deposit always has commanded a premium price. It is low in inherent ash (averaging about 5%) and low in volatile matter. It is hard, slow burning and long lasting.

The entire output is handled exclusively by Lehigh Navigation-Dod-



OVERBURDEN is removed and coal is recovered in seven planned steps. The completion of Step 7 is at a depth of 750 ft below original surface.

son Co., Bethlehem, Pa., a subsidiary sales company of Lehigh Coal & Navigation Co. Officers and personnel of LN-D were in close touch with the Fauzio brothers throughout the construction of the plant and their suggestions for optimum service to truck and rail customers are embodied in many of the facilities. Long years of experience in marketing anthracite backed up these suggestions.

This Panther Valley anthracite has gone to market for almost a century and a half. Trademarked "Old Company's Lehigh" anthracite, it has become a well known fuel over a wide area and for a number of uses. It is ideally suited for chemical processes and metallurgical purposes because of its high fixed-carbon content. It is being used successfully in the manufacture of foundry and blast-furnace coke, in gas generation and in processing carbon, and in sintering, pelletizing and agglomerating ores. It has been shipped to many foreign countries, with recent orders including shipments to Mexico and Okinawa. Of course, the bulk of it still moves to New England, the Middle Atlantic States and Canada.

Stripping to a Depth of 750 ft In Seven Planned Steps

The plan of recovery of the massive anthracite deposits at Greenwood is shown in the accompanying cross-section of the measures.

The well-designed steps are calculated to provide a proper balance between the outgo in removing rock and the income from producing coal.

One of the two pits, the East pit, extends 3,000 ft along the strike of the measures and is down to Step 7, a depth of 750 ft from the original surface. The West pit, taking another 3,000 ft along the strike, is well advanced on Step 3. The bottom rock in the East pit shows evidence of the underground operations conducted in the past—down to the third level.

In this rugged proving ground for earthmoving equipment, the main burden of excavation is handled by 6½-cu yd shovels in a bench-mining sequence of operations. Spoil and coal must be hauled out of the pit since backfilling is not possible in advance of the completion of Step 7. The haulage fleet operated by the Fauzio brothers consists of 55 Euclid trucks of 22-ton capacity.

A total of 18 electric- and diesel-powered shovels and draglines, ranging in capacity from 2½ to 6½ yd, are in service at the project. Overburden drilling is performed by 15 rotary units—Bucyrus-Erie 40-R's. Service equipment includes 25 trucks, and numerous bulldozers, cranes and graders. The combination of modern rotary drilling and AN-oil blasting agents is one of the main factors permitting a job of this size to be handled with high efficiency and economy.

Operations began in the East pit in

June, 1945. Since then, the project has involved the handling of more than 100 million tons of material, rock and coal. The bottom rock of the Mammoth vein sets the stripping limit at the north. The south limit provides a final highwall slope that will prevent slides into the pit. The Mammoth vein ranges in thickness up to 100 ft.

The haulage ramp in the East pit was a hairpin road on an 8% grade. It was a mile long from the floor of the pit to the surface. The West pit, an extension of the original job, will be worked in a similar way by the Fauzio organization.

Overburden is removed in 40-ft-thick benches, as shown in accompanying illustrations. It is estimated that the West pit will yield over 4½ million tons of coal, allowing ample time for further development of future pits.

Haulage distance from the pit to the new Greenwood plant is relatively short—approximately 1½ mi—over a specially-graded, high-speed truck road. The raw coal is hauled directly to a precleaning plant located on a hillside adjacent to the main structure. The trucks come in on a road level with the top of a 350-ton hopper into which the raw material is dumped. Rock is removed from the lump sizes on picking tables, and breaker rolls reduce the material to minus 4½ in. A 400-ft-long conveyor belt transports the raw coal from the precleaning plant to the head of the preparation circuit in the main building.

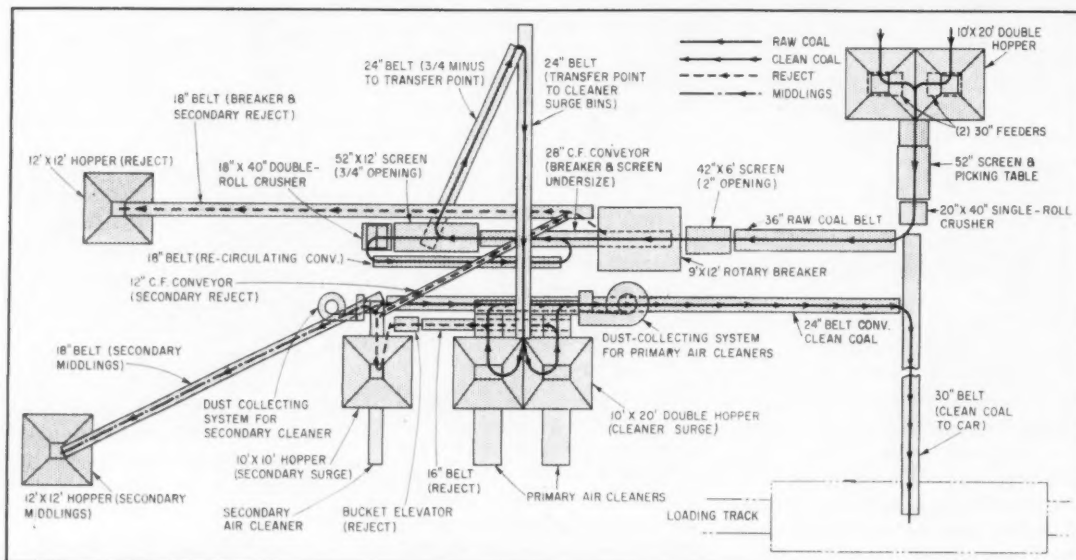
Future Outlook For Panther Valley Anthracite

In view of the historic declining trend in the annual movement of anthracite, what is the future outlook for a new hard-coal operation?

In discussing the potential for Greenwood, Foster F. Frable, vice president (sales), Lehigh Navigation-Dodson Co., pointed out that the very low ash and excellent quality of this new Old Company's Lehigh Greenwood coal have enabled sales in 1961 to run considerably ahead of last year. Further, because of the unusually high carbon content in the Greenwood coal it is finding the new markets that portend even greater sales in 1962.



COMPACT PLANT relies on two-stage air cleaning to upgrade $\frac{5}{8}$ x0 coal to uniform product. Main plant covers only 1,600 sq ft of space. One man oversees all the cleaning, crushing and sizing units.



PLAN VIEW of plant shows compact arrangement of equipment and coal flow through breaking, screening and jig units.



COAL BUYER inspects clean coal with Max Rice (right), who serves as company president and sales manager.



EXPANDING MARKET for Rice Brothers special stoker coal is truck trade serving nearby communities.

Two-Stage Air Cleaning Solves Preparation Problem

New low-cost preparation facilities enable a Pennsylvania strip operator to overcome a difficult cleaning problem and meet the challenge of a tighter market.

PRODUCT CONSISTENCY, increased coal recovery and one-man plant operation are three important benefits credited to new preparation facilities at the Rice Brothers Coal Co., Morann, Pa. These new facilities not only have enabled the company to solidify its position in present markets but also to expand into new ones.

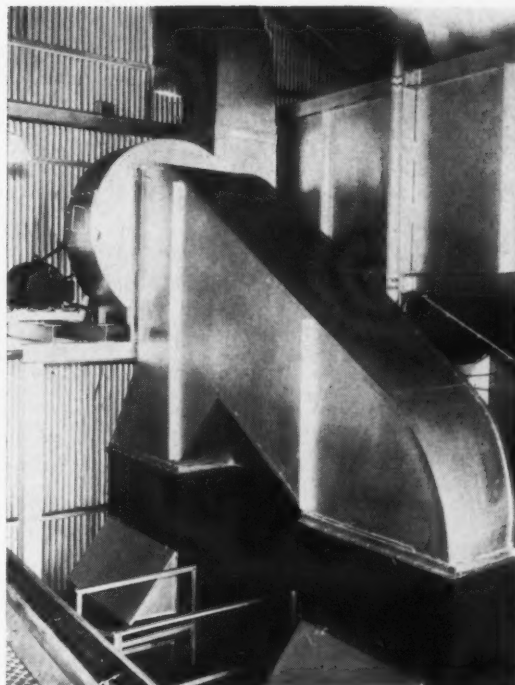
To meet the challenge of a more competitive market that developed in 1959, Rice Brothers started a search for new preparation facilities. In the past, the company relied on hand-picking of the larger sizes and selective loading in the pit to improve product quality. With this setup the company had difficulty in maintaining consistent quality and, as a consequence, decided to build a preparation plant.

Being a comparatively small strip operator, Rice Brothers wanted a plant that would not only yield the quality of product required by the company's customers but which also could be built with a minimum capital expenditure. One low-cost cleaning unit suggested was the Ridge Airjig, one of which could be brought to the plant for a demonstration. On the basis of results achieved with a demonstration unit, Rice Brothers signed a contract with Ridge Equipment Co. for the design and construction of an air-cleaning plant that would yield 140 tph of clean $\frac{1}{8}$ x0 coal.

The Cleaning Problem

Several problems confronted the plant designers and made plant lay-

AIR SEPARATORS yield 140 tph of clean coal. Primary refuse is recleaned in secondary air unit.



out more difficult. For example, a 1- to 1½-in binder in the seam has a specific gravity near that of the clean coal and it usually adheres to the coal, forming locked particles. Furthermore, there is some high-ash coal near the rock binder and it, too, has a specific gravity near that of the coal. A number of thin streaks of impurities also run through the seam. All of Rice Brothers production comes from three strip pits and in wet weather there is the additional problem of handling wet coal.

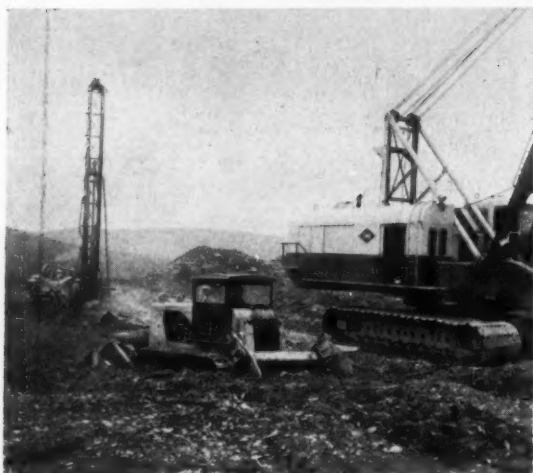
These problems led to the design of a two-stage plant which would include two 48-in Ridge Airjigs for primary cleaning, a 24-in secondary Airjig, rotary breaker, crusher, screens and conveyors. This equipment is housed in a structure that covers only 1,600 sq ft. The Airjig comes as a package unit with all motors, variable-speed motor reducers, blowers and controls mounted on a common base with the separator section. The entire unit may be transported on a long-wheelbase truck.

Management notes that the breaker and crusher are very important units in getting effective cleaning with the Airjig. Crushing not only frees most of the coal from the im-

purities but also aids in distributing moisture over the larger surface area exposed by the formation of the smaller sizes. With moisture thus distributed over the fine coal, management notes that the plant is able to operate effectively. For instance, the plant can process coal with 6% moisture without difficulty and under some unusual conditions has been called on to process coal with higher moisture content.

When the raw coal was hand-picked considerable clean coal was lost because pieces containing coal and rock were discarded with refuse. Management notes that the new cleaning plant consistently yields a $\frac{1}{8}$ x0 product with 8 to 9% ash, which was impossible with hand-picking. The volume of material hauled to the disposal area is about the same but it now contains a minimum of coal.

The company has a minimum of 25 yr of reserves of C coal which it can recover with present stripping equipment. When these reserves are exhausted, management notes that mine life can be extended by stripping to higher banks with larger equipment if market conditions are favorable. The company now produces an average of 1,000 tpd from the three pits.



EQUIPMENT TEAM in one of three pits includes bulldozer with ripper, rotary drill and 7-yd dragline.



LARGE BOULDERS complicate the stripping job in second pit. Cracks and fissures in strata make rock breaking difficult.



LOADING SCENE includes two diesel-powered shovels filling trucks.



THE RICE BROTHERS—Michael (left), Barber, Max and Felix, plan and coordinate mining and preparation activities.

Preparing the Coal

Trucks from the three pits deliver coal to a two-compartment 40-ton surge bin adjacent to the preparation plant. Two Ridge vibrating units feed the raw coal onto the original picking table, which now serves as a conveyor for transfer-

ring the raw coal to a 36-in plant-feed belt.

Equipped with Stephens-Adamson idlers, this belt elevates the feed to a 42-in by 6-ft high-speed vibrating scalping screen that removes the plus 2-in material. This product passes to a 9x12-ft rotary breaker where it is reduced to

2x0. The through products from the scalping screen and the rotary breaker combine on a 36-in chain conveyor and travel to a 52-in by 12-ft Ridge vibrator making a separation at $\frac{5}{8}$ in.

The $\frac{5}{8}$ x0 flows to a 24-in belt and the 2x $\frac{5}{8}$ passes to a Ridge 18x40 double-roll crusher for reduction to $\frac{3}{4}$ x0. The crusher product recirculates to the 52-in by 12-ft vibrator for rescreening at $\frac{5}{8}$ x0. After delivery to a 10x12-ft surge hopper, the $\frac{5}{8}$ x0 flows to a pair of 75-tph Ridge Airjigs.

The clean products from the two primary Airjigs pass to a 24-in belt that discharges into railroad cars. Reject from the primary cleaners flows to a 16-in belt and drops into a 12-in bucket elevator. This unit delivers it to a 10x12-ft surge hopper that feeds a 35-tph secondary Ridge Airjig.

Reject from the secondary Airjig passes to an 18-in belt which also carries the breaker refuse. The combined reject travels to a 12x12-ft refuse hopper outside the plant and then is hauled by truck to a disposal area. It is also possible to make a middlings product in the secondary cleaner and divert it to a bin for sale to truck customers.

One man oversees all the cleaning, crushing and sizing units in the main plant and is responsible for plant operation. Two other men are employed outside the plant to handle miscellaneous duties, such as, breaking lumps at the raw-coal hopper,



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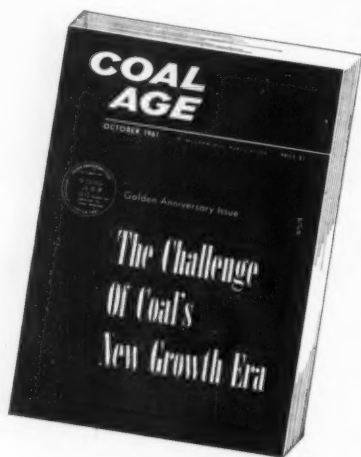


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*A Comprehensive Analysis
of Mine Managements'
Opportunities in the 60's
... in COAL AGE's
50th Anniversary Issue*

cleaning empty railroad cars and dropping loaded cars to the side-track.

Mining in No. 1 Pit

A truck-mounted Davey rotary dry-type vertical unit handles the drilling job in the three pits. Equipped with a Varel V2 6¼-in bit and operated by one man, the unit sinks in average of 100 ft of hole per hour in the No. 1 pit. An International TD 25 bulldozer, equipped with a Greenville two-tooth hydraulic ripper, works ahead of the drill to remove brush and make a level drill road. This unit spends about 50% of its time building drill roads and leveling a working bench for the stripping unit.

Overburden in the No. 1 pit, averaging 40 ft in thickness, includes 4 ft of sandy shale immediately above the coal, then 8 ft of sandstone, and hard shale to the surface. There is very little dirt on top of the shale. In drilling through this material, bits average 4,000 ft of hole before retipping.

Holes are spaced 15 ft apart in rows on 18-ft centers. They are drilled to within several feet of the top of the coal and if they intersect the seam they are backfilled several feet with cuttings. Four rows of holes are drilled to produce a pit about 72 ft wide.

Charging procedures include securing 4x8-in Hercules 176 primer to Primacord and lowering to the bottom of the hole, adding 200 lb of loose Hercules HP 61 nitro-carbonate, and topping the charge with a second 2x8-in EP 176 primer. Drill cuttings are used for stemming. All holes are connected with Primacord and are detonated simultaneously.

A Manitowoc 4500 dragline, equipped with a Page 6-yd bucket, handles the stripping assignment in the No. 1 pit. It works two 10-hr shifts per day.

Mining in No. 2 Pit

Overburden in the No. 2 pit averages 60 ft thick. It includes 15 ft of bedded sandstone immediately above the coal, and shale to the surface. Vertical holes are spaced 15 ft apart in rows on 21-ft centers, and are drilled with the truck-mounted Davey unit.

In one shift, one man has drilled

800 ft of hole and also helped charge and connect holes. Each 60-ft hole receives a 300-lb charge of the Hercules nitro-carbo-nitrate, with a Hercules 4x8-in EP 176 primer at the bottom and a 2x8-in primer at the top. Holes are laced with Primacord and are detonated simultaneously at the end of the shift.

A Lima 2400 diesel-powered dragline, equipped with an Esco 7-yd bucket, works two shifts uncovering coal in the No. 2 pit.

Mining in No. 3 Pit

Holes are drilled vertically in the No. 3 pit on the same 15x21-ft pattern as in the No. 2 pit. Overburden is shale, which averages 65 ft in thickness. Charging and shooting procedures are the same as in the No. 2 pit.

A Bucyrus-Erie 200W dragline with a Page 5-yd bucket strips around the clock in the No. 3 pit.

Loading and Hauling

To provide maximum flexibility in loading in the three pits, Rice Brothers rely on three loading shovels. Powered by diesel engines, they include two Koehring 304 units with ¾-yd dippers and one Koehring 605 with a 1½-yd dipper. These shovels usually work in different pits but in some instances two have been temporarily assigned to one pit. They load only on the day shift.

Haulage units include two company-owned International 25- and 16-ton end dump trucks and a number of hired trucks. These units carry coal an average of 1½ mi to the preparation plant.

Management of the three strip pits and preparation plant is shared by the four Rice Brothers—Max, Michael, Barber and Felix. Max serves as president and sales manager, and sets over-all company policy. Michael, Barber and Felix oversee pit activities and coordinate equipment moves. Each of the four brothers has his own Chevrolet four-wheel-drive pickup truck for traveling about the property. A Motorola short-wave radio in each truck, plus additional units in the company office and the home of Max, make it possible for them to discuss operating problems while at various points on the property.

BULLETIN:

Shell now offers a fire-resistant hydraulic fluid of superior quality—and at comparable cost to flammable hydraulic oil

By mixing Shell 3XF® Mine Fluid with ordinary drinking water—right at the mine—you get an effective fire-resistant hydraulic fluid at the lowest possible cost.

Here is the story behind this historic new product of Shell Research—the first fire-resistant hydraulic fluid to be approved by the U.S. Bureau of Mines under Schedule 30.

WITH THE development of Shell 3XF Mine Fluid, the danger of underground mine fires can be greatly reduced.

How 3XF was developed

The scientists at Shell Research started with two basic facts. Mineral oil, they knew, is an excellent hydraulic fluid. But it burns.

Water is an excellent fire extinguisher, but not the best lubricant.

Why not find a way to combine the two? Oil for lubrication, water for safety.

The result of their effort was a unique kind of water-in-oil emulsion. Droplets of water were literally encased in the oil. The final product: Shell 3XF hydraulic fluid.

The oil lubricates. The water provides all-important protection against fire.

How it was proved

Exhaustive tests of 3XF hydraulic fluid proved its effectiveness—under fire.

Even when sprayed into a flame,



Fire-resistant hydraulic fluid can be made at the mine by mixing ordinary drinking water with 3XF Mine Fluid.

3XF hydraulic fluid would not create a fire hazard.

However, safety alone was not enough. 3XF hydraulic fluid also had to work in existing mining machinery. And it would be most desirable if it could be compounded *at the mine*.

So, Shell Research developed a special concentrate called 3XF Mine Fluid. Blend 40% drinking water into 60% concentrate—mix well and the product is ready for use.

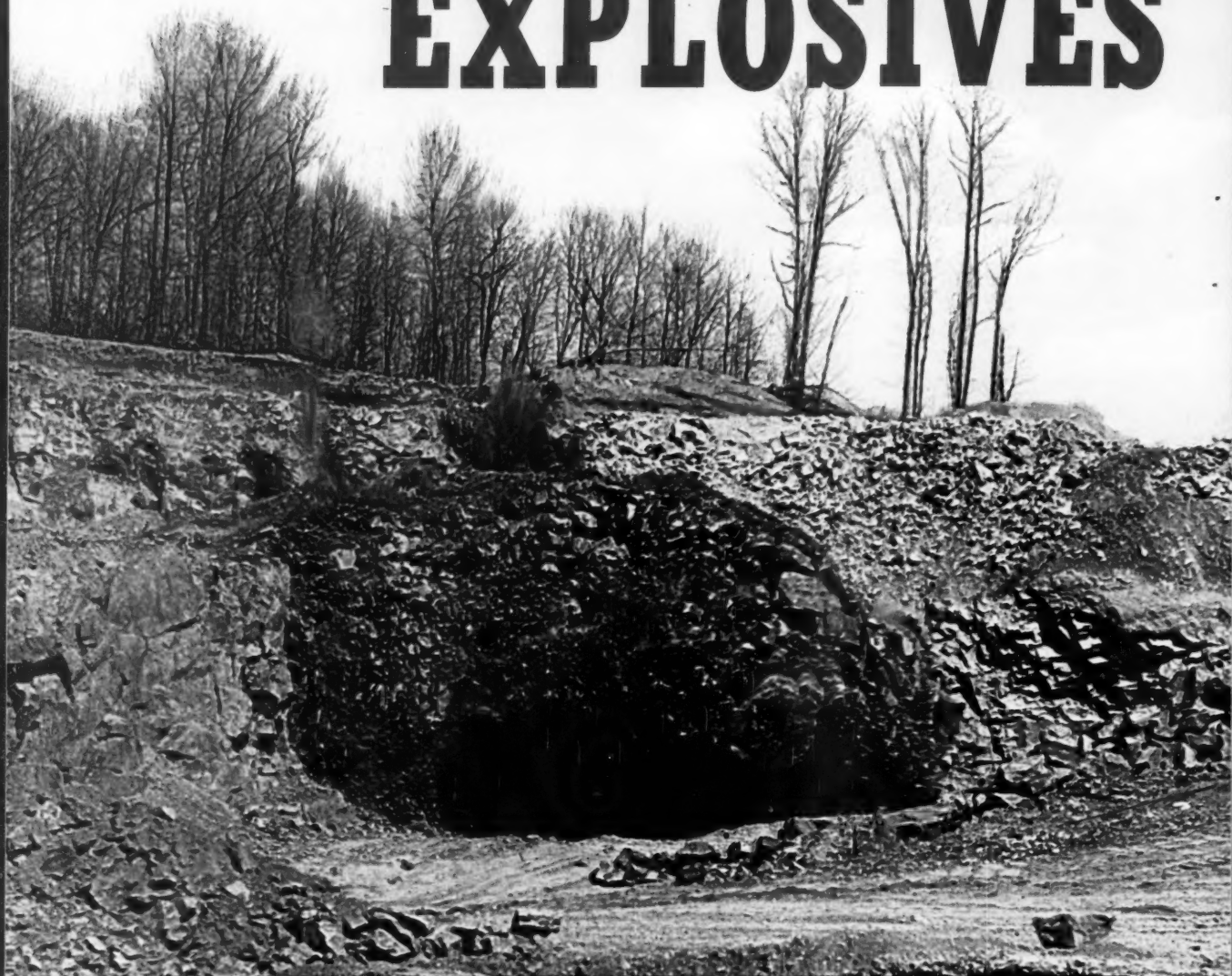
On February 18, 1960, Shell 3XF Mine Fluid ushered in a new era of mine safety when it became the first fire-resistant fluid approved under U.S. Bureau of Mines Schedule 30.

For complete data about 3XF Mine Fluid, contact your Shell Industrial Products Representative. Or write: Shell Oil Company, 50 West 50th St., New York 20, N.Y.



A BULLETIN FROM SHELL
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provide better products for industry.

EXPLOSIVES



At this Maryland quarry, Ammodyte,® a low-cost cartridged explosive, was used to obtain maximum fragmentation and displacement of this tough, blocky granite gneiss. In the large photo above, notice how the toe is sweeping clear, resulting from well planned bottom initiation with Rockmaster® millisecond delay electric blasting caps. The resulting muck pile is properly laid out for easy, efficient digging.

ENERGY...

Are you aware of the many ways it is cutting costs all along the line? . . . Boosting production? . . . Increasing life of heavy equipment? . . . Allowing more efficient use of total man-hours?

Cheaper blasting materials, new blasting techniques, and improved drilling equipment, have reduced the cost of explosives energy to the point where it is doing work formerly reserved for mechanical equipment. And doing it cheaper, faster, and more efficiently.

In the Maryland quarry shown here, achieving good breakage was a difficult problem. This granite gneiss is tough and blocky. And production demands couldn't wait for drop balling or a blocked crusher. Working with the Atlas Representative, these profit-minded operators modernized their blasting techniques.

By adjusting hole diameter, burden and spacing, and utilizing the wallop of low cost Ammodyte,[®] these operators are gaining breakage and displacement never achieved before. Production speeds have been increased because they have been able to dig shots quicker and easier and gain maximum crusher production. In the process, they are realizing real savings in maintenance and wear on crusher, dipper teeth, wire rope, and truck bodies.

In coal stripping, other alert, up-to-date operators are using explosives energy to accomplish new tasks. Explosives force is being used to move up to 50% of the overburden directly onto the spoil pile. Mechanical handling costs are reduced, coal is uncovered more rapidly.

In open pit ore mining, explosives factors are being designed to gain additional fragmen-

tation. Much of the material by-passes the primary crusher. Production is speeded, overall costs lowered.

In construction, contractors are finding that explosives energy can save them unwelcome maintenance costs on valuable equipment, and accomplish work faster, more efficiently.

In these times of change, the economics of drilling and blasting have changed also. Looking for ways to reduce blasting costs alone is not enough. The real savings come when you look at explosives energy as a way to reduce overall operating costs.

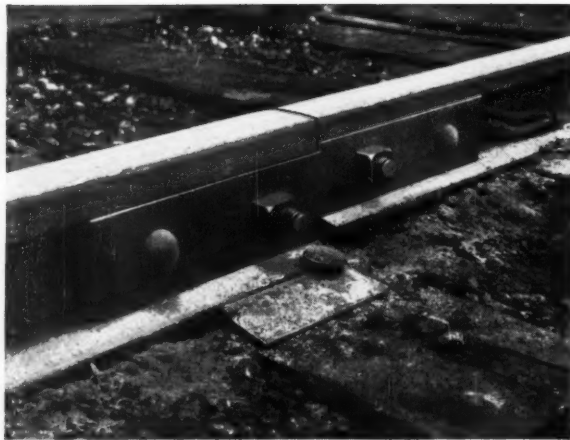
For a closer look at some of the ways explosives energy can lower your costs, investigate Atlas' full line—the only full line of ammonium nitrate and explosives in the industry. Expanded plant facilities are now in production at Joplin, Mo. and Reynolds, Pa., to assure ready availability of all products. And to give you faster, more flexible local service, expanded distribution facilities are being established coast to coast.

Call in your Atlas Representative. His experience with the newest advances in explosives, blasting agents, and blasting techniques can help you measure the relative economy of explosives energy vs. mechanical energy for your particular operation. Ask him about it. Or write directly to:

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EXPLOSIVES DIVISION • WILMINGTON, DELAWARE



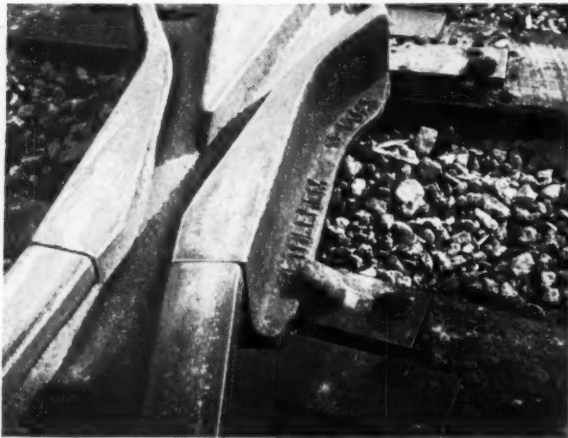
ATLAS EXPLOSIVES



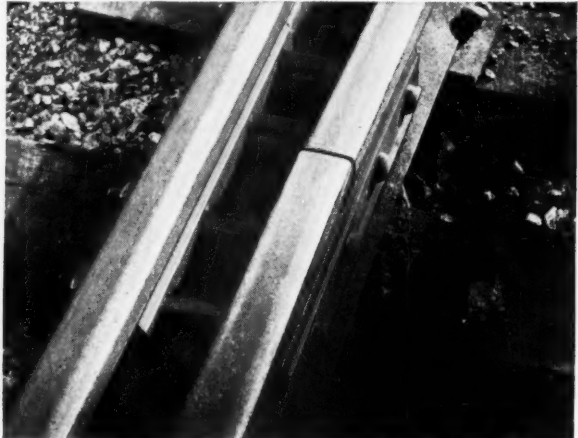
BETHLEHEM COMPROMISE JOINT, DESIGN 976, also called "offset splice bar," is forged and machined from heavy bar stock, for connecting rails of different section, or rails of same section but of different joint drillings.



BETHLEHEM GUARD RAIL, DESIGN 745, is one-piece type for use with wood ties. No loose parts such as clamps, bolts, braces are required. Furnished complete with foot-guards, ready for installation.



BETHLEHEM HOOK-TWIN FROG PLATES grip rail base tightly, distribute track motion over tie, remove direct pull from spikes which anchor the plate. Used in pairs, easily adapted to any frog position or angle.



BETHLEHEM SWITCH HEEL BLOCK JOINT, DESIGN 992, helps maintain heel spread and track gage at the heel end of the switch. Keeps closure rail and switch point correctly aligned, vertically and horizontally.

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Besides good roadbed, sound ties, and heavy-duty rail, a smoothly operating haulageway calls for a lot of "little things." Little things like hook-twin frog plates, compromise joints, switch heel blocks, and the many other inconspicuous but vital accessories of modern trackwork.

Bethlehem engineers will be glad to look over your workings to determine where and how these important accessories might spruce up your haulage track and lower your maintenance costs. Just call or write to the nearest Bethlehem office. Or to the address below.

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THE USEFULNESS OF A



6 or 8-yd. Lima Type 2400, shown stripping coal in Pennsylvania, also available with special 10-yd. coal loading dipper.

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- **MAIN MACHINERY** positioned to hold counterswing to minimum, allow faster swing
- **DRUMS**—Extra wide, tandem mounted for more cable capacity, longer cable life
- **ANTIFRICTION ROLLER BEARINGS** reduce wear at all important bearing points
- **AIR-CONTROLLED CLUTCHES** are extra large; give instant response

• **TORQUE CONVERTER** reduces shock loading, prevents stalling . . . lengthens cable life, lowers maintenance

• **PRECISION AIR CONTROL** lets operator feel action without fatigue; means more output, greater efficiency

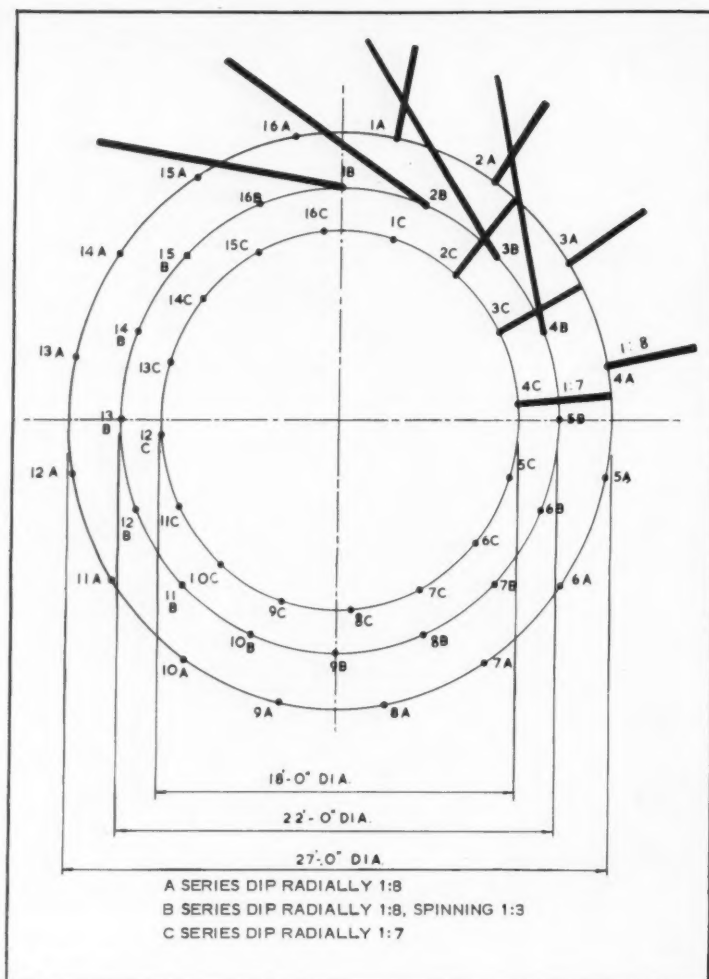
Judge the 2400 for yourself—ask your nearby Lima distributor for a free copy of the 32-page bulletin describing the 2400 in detail . . . or write to us here in Lima.

There's a Lima type and size for every mining operation—shovels to 8 yd.; draglines variable; diesel or electric.

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DRILLING PATTERN for injecting chemical grout to seal porous sandstone in the Monktonhall Coal Mines in Midlothian, Scotland.

Shaft Sinking With Chemical Grout

Completion of two 3,000-ft coal-mine shafts was made possible by the use of a new grout which reduced water flow 95%—from about 144 to 40 gpm.

THE PROBLEM of sealing porous sandstone encountered in sinking 3,000-ft shafts at Monktonhall, Midlothian, Scotland, was solved through the use of a new chemical grout. The shafts are among the deepest ever sunk in British coal-mining history.

Shaft Plans and Problems

Plans called for the sinking of two shafts to a depth of 3,000 ft. One is to be used as a main coal-hoist shaft with skips and the other to house a conventional cage hoist.

The circular shafts have a finished diameter of 24 ft and are lined with concrete made of 1:2:4 mix with a minimum thickness of 12 in. In areas where excessive amounts of ground water were encountered thickness was increased up to 3 ft to withstand the hydrostatic pressure.

Slightly below the 2,000-ft level porous sandstone was encountered. The inflow of water at this level was great enough to threaten completion of the shafts. The sandstone stratum was about 100 ft thick.

Water flow into the sump from open holes drilled 60 ft below the top of the sandstone layer was measured at 144 gpm. At this point the need for grouting became apparent. All recognized grouting techniques were studied. Engineers of the Comentation Co., Ltd., England, working on the project determined that conventional grouts, such as cement and cement combined with silicates were unsatisfactory in some of the sandstone's strata.

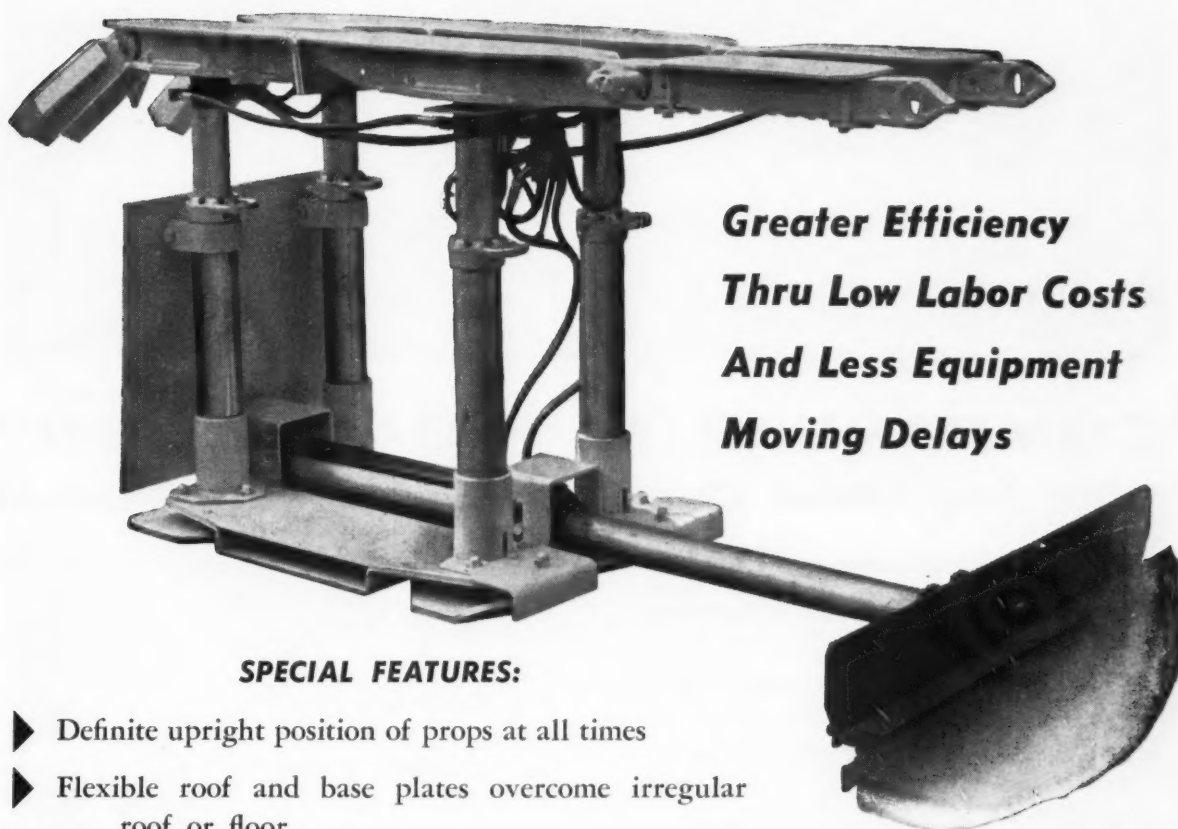
Previous success with a new AM-9 chemical grout, manufactured by American Cyanamid Co., was the deciding factor in using it in this instance. AM-9 is a mixture of acrylamide and methylenebisacrylamide which forms a cross-linking polymer sufficient to render soil impermeable to water when catalysed with a system of dimethylaminopropionitrile and ammonium persulphate. Gel times can be controlled with 90% accuracy from 5 sec to a number of hours. Gel strength is determined by the concentration of the material used.

One of the features of AM-9 which indicated its use in this application is its low viscosity (1.2 to 1.7 centipoises). This low viscosity was particularly important because it was felt that the cement mixtures contained particles too large to permit the grout to enter the minute interstices of the sandstone, while the chemical mixture would be able to penetrate wherever water could pass.

How Grout Was Applied

Treatment of the sandstone bed to its entire depth was carried out from the bottom of the shaft through injections into a series of holes.

COMPLETE RECOVERY WITH . . . UNION Hydraulic SELF-MOVING Support System



***Greater Efficiency
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And Less Equipment
Moving Delays***

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- ▶ Definite upright position of props at all times
- ▶ Flexible roof and base plates overcome irregular roof or floor
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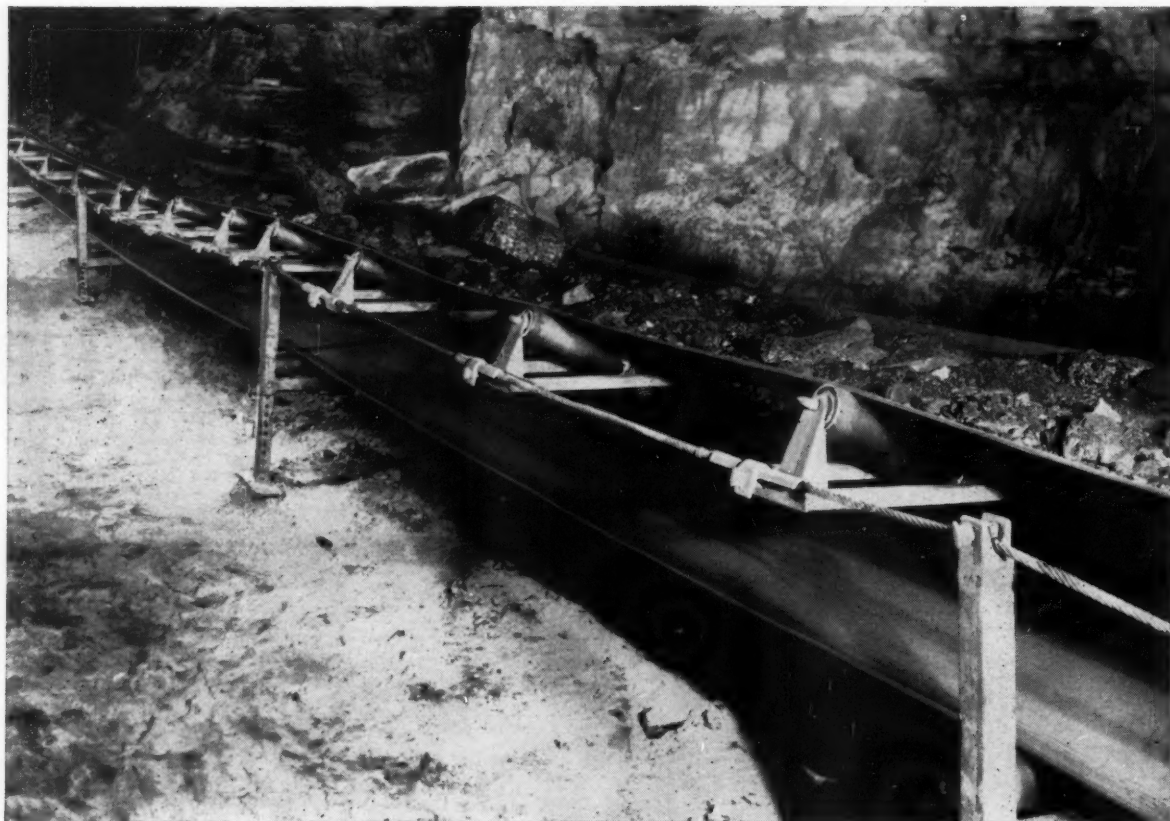


Photo courtesy of The Jeffrey Mfg. Co

COMPARE R/M "COALMOVER" With Any Other Conveyor Belt on the Market

- Light Weight for Easy Handling & Re-spooling
- Holds All Underground Types of Fasteners Longer
- Solid Edge Construction Eliminates Fray & Fan Out
- Engineered to Haul *Either Side*—Top or Bottom
- Higher Pulley Grip at Lower Tension—No Slip
- High Coefficient of Friction—No Coal Slippage as with Plastic
- Will Not Stiffen at Low Temperature—Not Thermoplastic

In addition, this *entirely new* conveyor belt designed and engineered for the coal industry gives you *exclusive* R/M flexibility over reverse bend and snub pulleys.

It trains naturally, troughs easily to haul full loads in low headroom—with maximum resistance to rips, gouging, abrasion and impact! "Coalmover" requires minimum take-up adjustment—and like all R/M underground conveyor belts it's fire resistant throughout. Designated "Fire Resistant, U.S.B.M. No. 28-10."

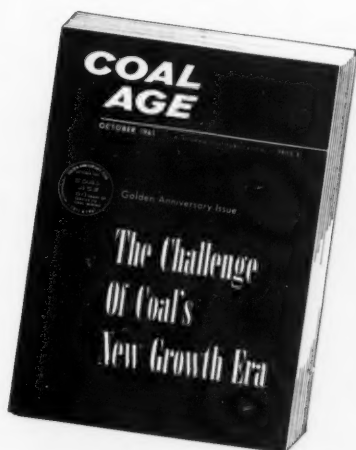
Let an R/M distributor show you how to meet the new standard for performance with "Coalmover" Conveyor Belt.

"COALMOVER" HAULS MORE...LASTS LONGER...COSTS LESS

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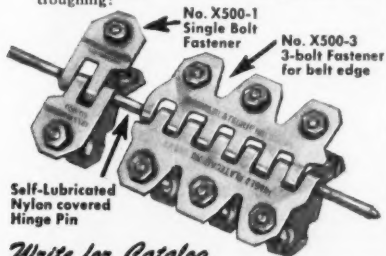


LOOK FOR OCTOBER COAL AGE

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Recommended for mines, quarries, construction work, storage yards — wherever belts length must be frequently changed. Hinged Plategrip Fasteners make a strong, flexible joint in heavy duty conveyor belts, trough naturally, ride smoothly over pulleys, yet can be separated by simply pulling the hinge pin. Improved design takes the new smaller diameter self-lubricating nylon sheathed cable hinge pins. No. X500-1 single bolt fasteners and No. X500-3 3 bolt fasteners (used at outside edges) to reinforce edges and aid troughing:



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The first series of 16 holes was drilled on a 27-ft diameter from the bottom of the shaft to 20 ft. The dip was 1 in 8, or approximately 7 deg from the perpendicular (see diagram). The second series also was drilled with the 1 in 8 dip but was spun at 1 in 3, or about 20 deg from the perpendicular to a tangent on the arc of the shaft, on a diameter of 18 ft.

The first series was drilled to 40 ft after stand pipes were inserted and proved. They were then treated with the chemical grout. The operation was designed to determine the best techniques. A total of 3,470 gal of grout was injected into the 16 holes.

The holes were then redrilled to 55 ft and grouted with a sodium silicate-sodium bicarbonate solution. They were then redrilled a second time to 70 ft and injected with the silicate-bicarbonate mixture. This grout was used to close up any large fissures in the sandstone and prevent undue loss of the chemical grout.

The second series of holes was then drilled to 40 ft and each was injected with 100 gal of chemical grout. Gel time was set at ½ hr. Injection rate was 2 to 4 gpm. Pressures at the end of the injection ranged from 1,300 to 2,500 psi.

A third series of holes was drilled to 20 ft within the other two series. After stand pipes had been inserted and proved, the holes were deepened to 50 ft and treated. Volume of grout ranged from nil to 300 gal. The third series was then deepened to 90 ft and again treated with the chemical grout.

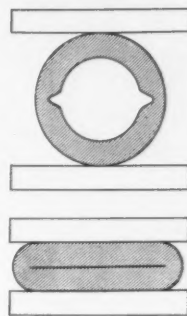
Final Results

When the shaft was sunk through the entire stratum of sandstone, it was found that water inflow from the walls was about 40 gpm, of which at least two-thirds, perhaps more, was believed to come from the ground above the sandstone layer or from the upper portion of the sandstone in which the injection pipes had been inserted but not treated with the chemical grout.

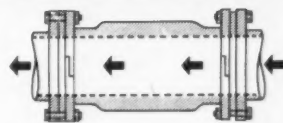
As a result of the use of the AM-9 grout, successful continuation of the shaft construction was assured. It was felt that the water inflow from the treated area of the shaft had been reduced 95%.

Massco-Grigsby PINCH VALVES

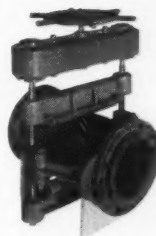
"Hinged" sleeve permits tight closing reduces wear.



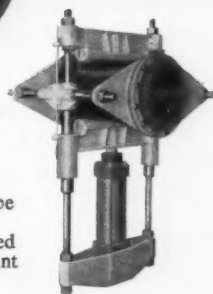
Recesses in sleeve serve as "hinges" during compression.



Unobstructed flow eliminates high friction loss; and there are no metal parts in contact with pulp or liquid.



Several types of closing mechanisms are available, from handwheel to motorized.



Automated Systems.

Completely automatic systems may be coordinated and interlocked with other plant equipment.

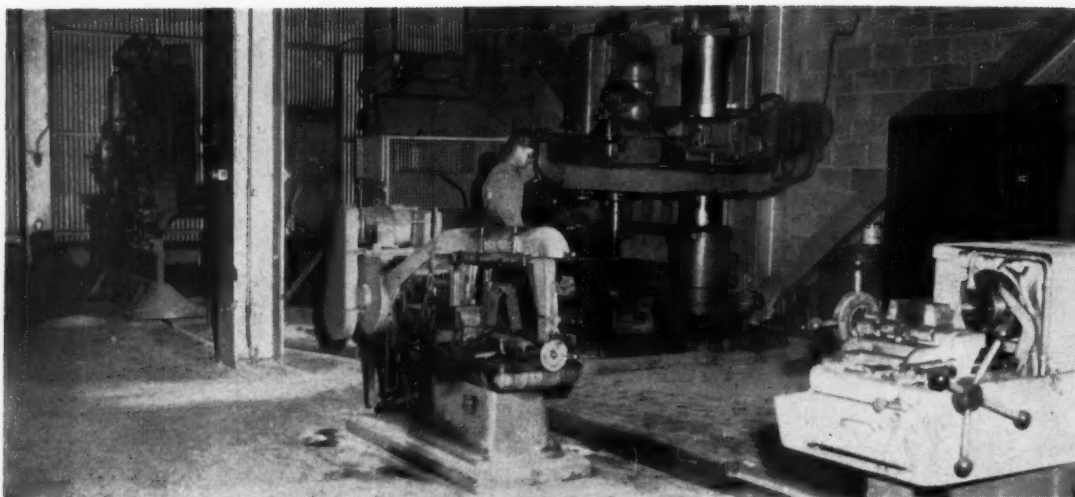
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Maintenance Ideas



IN-PLANT SHOP at Maple Creek has equipment for handling nearly all major repair work on plant units. Application of wear- and abrasion-resistant material helps minimize repair. Spare equipment plays vital role in 24-hr plant operation.

Preventive Maintenance Eliminates

Regular inspection and repair before major wear takes place, application of long-lived materials and accurate records make possible 24-hr operation of two plants processing 40,500 tpd of raw coal for U. S. Steel.

SCHEDULED MAINTENANCE, application of special long-lived materials, and accurate maintenance records provide the foundation for 24-hr operation without costly delays at U. S. Steel's Maple Creek and Robena preparation plants.

These two plants are designed to process a total of 40,500 tpd of raw coal and are the principal source of coal for U. S. Steel's blast furnaces in the Pittsburgh area. Any interruption in the flow of coal through these plants, either because of mechanical or electrical failure, can be quite costly in the loss of coal needed for these furnaces. To prevent costly delays, management

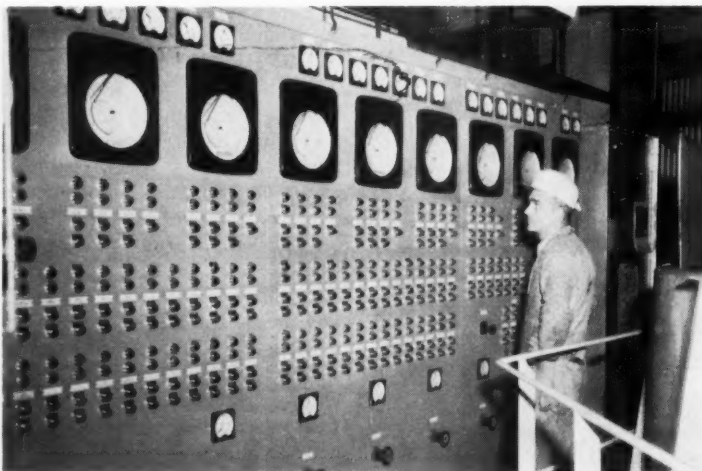
started a preventive-maintenance program many years ago at the Robena plant, and has constantly improved upon it since, incorporating a number of additional ideas in the new Maple Creek plant.

Building the Program

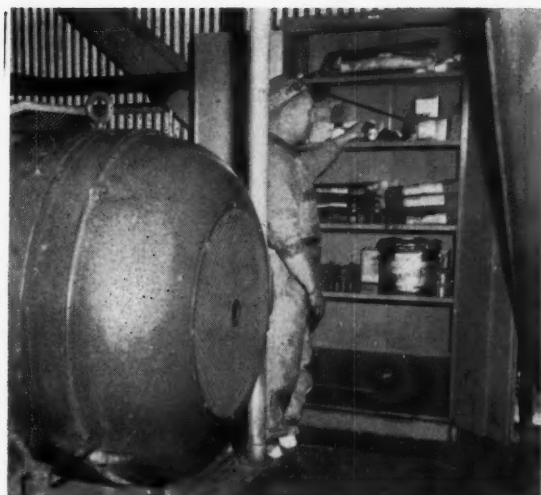
The basic principles of the time-tested maintenance program at Ro-

bena are: (1) systematic inspection; (2) an accurate card record of every plant motor; (3) scheduled maintenance of all motors, relays, breakers and other switchgear; and (4) running records of operating time for all plant units.

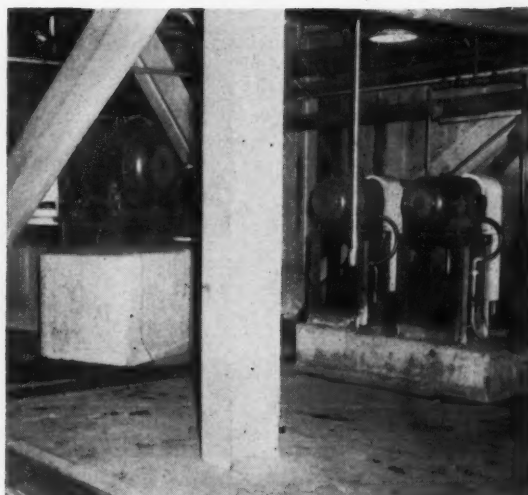
In planning the new Maple Creek plant, which went into operation in November, 1959, (*Coal Age*, June, 1960, p 94), U. S. Steel's engineers



AMMETERS and other indicating devices, installed on the main panelboard, show current flowing to units. A sudden increase above normal alerts operator.



SPARE-PARTS LOCKERS, located throughout plant, contribute to faster repairs and save time for mechanics.



DUAL PUMPS, which can be put in service in a matter of seconds, are key units in maintaining 24-hr plant operations.

Costly Preparation Delays

specified special materials, spare units and refinements in the electrical system to further improve plant maintenance. In setting up the Maple Creek maintenance program, the corporation took full advantage of the Robena experience and refined plant design and maintenance techniques accordingly. Both preparation plants process feed from the Pittsburgh seam.

Robena Mechanical Maintenance

Centrifuges, screens, pumps and conveyors receive the most severe service at the Robena plant and are subjected to the most abrasive and corrosive action. As a consequence, they receive careful attention in the scheduled mechanical maintenance program.

A typical example of scheduled maintenance at Robena is the rebuilding of the screw conveyors for centrifugal filters. Robena experience shows that rebuilding costs are minimized when they are removed from service after about 1,180 hr of operation. By removing a screw conveyor after this period, repair usually is limited to building up the edges of the screw.

This build-up work is done by hand with the aid of a welding positioner. After a screw is built up with a tungsten-carbide gas rod, it is placed on an edging stand where it is hard-faced on the edge with Haystellite No. 2 composite rod. Any high spots on the rebuilt screw are detected when it is gaged and are ground off.

Every 2 wk, Robena maintenance men adjust all pump impellers. To minimize maintenance costs for pumps handling abrasive and corrosive slurries, chrome-iron casings and stainless steel impellers are specified for these jobs.

By increasing the slope of vibrator screens to an optimum, management reports that screen life has been increased. Furthermore, the steeper slope lets the coal run faster

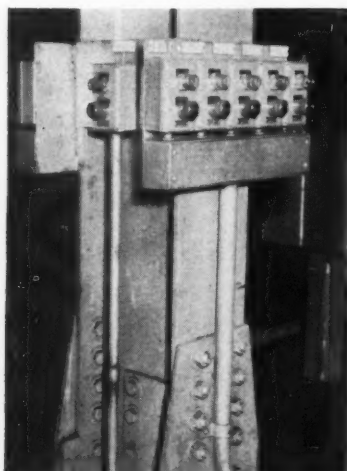


WIRING DIAGRAMS are enclosed in plastic and kept in a special book.



COMPLETE FILES provide information on all plant units and motors.

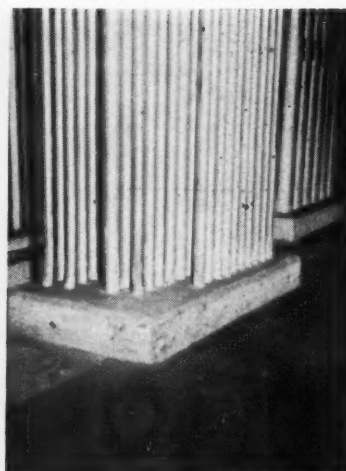
Maintenance Ideas



JOG BUTTONS near units enable maintenance men to service them easier.



TAPS in welding circuit eliminate need for moving welder to job site.



RAISED CONCRETE BASE prevents water gathering around conduit.

in a thinner bed. Thus screening efficiency is higher and screens last longer. Bearing life has also been extended.

Special materials are used to line chutes and heavy-medium washing cones to increase service life. For instance, stainless steel lining is used in chutes having a minimum pitch or where a minimum of push water is desirable. Stonhard ceramic material is used to line the two 20-ft washing cones and any launder chutes with comparatively steep slopes.

Stainless steel liners in the bottom of chain conveyors not only increase the life of these units but also reduce the power requirements for drives. Stainless steel wear strips on the chain guides last twice as long.

Robena Electrical Maintenance

During the years the Robena preventive maintenance program has been in operation, electrical failures have been virtually nonexistent. The goal of the program has been to prevent costly plant downtime. The things discovered during the regular inspection and reconditioning operations have demonstrated the value of preventive maintenance.

Some of the benefits of the program include elimination of costly rewind jobs, and spotting bearing

and shaft troubles before they develop into burn-outs. Plant shut-downs because of motor failure have been prevented.

Maple Creek Maintenance

In working out specifications and design features for the Maple Creek plant, U. S. Steel's goal was to build a plant that would require a minimum of repairs. Plant specifications included application of wear- and abrasion-resistant materials wherever possible, spare units or motors, hour meters for all equipment subjected to severe wear, and ammeters for all major units. Some applications of wear-resistant materials are:

Stainless Steel — In places where rusting is a factor, such as coal and refuse sluices from the wet-washing tables and bottom decks of fine-coal vibrators; launders leading from the Chance cone to dewatering screens; and where flow of material is critical, or where build-up cannot be tolerated, as in discharge chutes from the centrifugal filters.

AR Steel — For impact resistance, in all discharge chutes from belt conveyors; refuse chutes leading from the Chance cone to dewatering screens.

Cor-Ten Steel — Water storage tanks.

Other special materials used in the Maple Creek plant include rubber piping for all sand and water circuits and Stonhard ceramic lining for sumps and the Chance cone. In areas exposed to water, stair treads and floor grating are constructed of zinc-coated steel. The plant is sheathed in vinyl-coated steel, secured to the main structure with stainless-steel bolts.

All pumps except those handling fresh and clarified water have Ni-hard casings and impellers. Where abrasion and corrosion are not a problem, chrome-iron pumps are used. Neoprene buta-N belt, which is not affected by oil, carries the clean coal from the Convertol processing units.

Spare equipment also plays an important part in the Maple Creek maintenance program and helps make possible round-the-clock operation. For instance, all pumps are installed in duplicate and the spare can be put in service without interrupting plant operation.

Other installed spare equipment includes a raw-coal feeder, raw-coal screen and centrifugal filter. Any one of the wet washing tables can be cut out for maintenance and its feed diverted to the other units.

Ammeters, on the main panel-board, show when major plant units are pulling normal current. A sudden or significant increase in current demand by any unit alerts the

plant operator to potential trouble, and corrective action initiated immediately.

All units subjected to abrasion are fitted with hour-meters to measure accurately their operating times. As more experience is gained with the various units and their service lives established, management plans to set up a time schedule for their overhaul. This schedule will include centrifugal filters, sand pumps, and raw-coal and refuse pumps.

In working out the details of the electrical system for Maple Creek, management sought ways to eliminate the need for as much maintenance as possible. To achieve this goal, a number of features were incorporated in the plant design. For instance, power centers are enclosed in rooms which are pressure ventilated with filtered air to keep dust out. Electrical equipment is mounted on elevated concrete bases to eliminate the possibility of flooding.

All but a few of the motors are totally enclosed and, as a result, motor maintenance is minimized. The open-type motors are cleaned with compressed air every 2 wk.

Totally enclosed motors are greased every 3 mo if they are operating five days per week. Mine management emphasizes that it is extremely important to prevent overlubrication of motor bearings. As a consequence, maintenance supervisors have specified the number of shots of grease for each size bearing. Motors with sealed bearings are scheduled to run for 5 yr without greasing and then will be removed, inspected and rebuilt if necessary.

Every 6 mo, power centers are cleaned and all components checked for tightness. Each circuit is meggered to detect potential trouble stemming from insulation failure.

All motors up to 75 hp are 440-V units and the larger ones are 2,300-V. Thus, significant savings in wire were realized. Leads for individual motors are carried in one conduit. To eliminate the problems of corrosion and water soaking through the insulation, plastic-covered wires are used. Where conduit comes up through the floor an elevated concrete block is incorporated in the floor. This elevated area prevents

Robena Motor-Maintenance Schedule

Type of Motor	Maintenance Procedures
Fractional horsepower, 110/220 V AC Three-phase, open-type, sleeve-bearing, wound-rotor	Checked, cleaned and oiled every 6 weeks. Removed for maintenance only if trouble develops. Checked every operating shift for bearing heat, oil rings turning properly or abnormal conditions. Blown, cleaned, brushes and rings checked weekly. Air gapped, oil changed monthly or oftener if conditions warrant. Motor reconditioned every 5 yr.
Three-phase, open-type, sleeve-bearing, synchronous	Checked each operating shift for bearing heat, oil rings, excitation current, voltage or abnormal conditions. Blown, cleaned, and brushes, rings and exciter checked weekly. Air gapped, oil changed, complete clean-up and inspection every 3 to 6 mo.
Three-phase, open-type, sleeve-bearing, squirrel-cage	Few on hand. Checked daily for bearing heat. Some checked daily, some weekly, for oil and ring condition, depending on application. Blown and cleaned weekly or monthly, depending on application. Reconditioned every 5 yr.
Three-phase, dripproof, sleeve-bearing, wound-rotor, 150-hp, 2,300-V Special application on centrifugal dryers	Checked each shift for bearing heat. Oil changed in pulley end weekly. Blown, cleaned, slip rings and brushes checked every 2 weeks. Complete oil change, bearings flushed, air gapped, rings and brushes checked monthly. Reconditioned every 5 yr.
Three-phase TEFC ball- and roller-bearing, wound-rotor	Rings, brushes blown, cleaned and checked monthly. Greased every 3 mo. Reconditioned every 5 yr.
Three-phase TEFC ball- and roller-grease-type bearing, squirrel-cage	Greased every 3 mo. Reconditioned every 5 yr.
Three-phase TEFC ball-bearing sealed Life-Line squirrel cage	Except for frequent checking for bearing noise, these motors are run about 5 yr then refitted with reconditioned or new bearings. Some units have shorter life.
DC, TEFC ball-bearing	Brushes, commutator checked, cleaned and adjusted every month. Greased every 3 mo. Commutator trueing done with grinding stone tool. Field coils and armature cleaned, painted when motor is down for reconditioning.

water from accumulating around the conduit. Terminals for leads are installed beside the starters at an elevation which permits an electrician to stand up to work on them.

To simplify maintenance and checking of electrical circuits, all units are identified by number on the operating panelboard, terminal-board wires, breaker and unit itself. By-pass, or jog, buttons which bypass the plant interlock, are installed near each plant unit. These by-pass buttons enable the maintenance men to check or service units without interfering with plant operations.

Each plant electrical circuit is kept on a separate sheet in a plastic

envelope. All circuits are incorporated in a notebook which is available to all plant electricians. Maintenance men have been trained to carry an electrical diagram with them when working on any unit in the plant.

To provide complete information on all plant equipment, Maple Creek keeps three separate files. The first file, arranged by unit numbers, lists for each unit the following: supplier, spare-parts list, original purchase order, operating instructions and drawings. The second file includes a list of the repair parts purchased for each unit, when each was used, part number and type of maintenance work done. The third file contains

data on all plant motors, including number, what equipment it can be used on and nameplate data. This file is cross indexed by unit and motor number.

Mechanical Maintenance

The Maple Creek mechanical maintenance program also emphasizes regular inspection and repair before major wear takes place. For example, centrifugal filters operate about 1,500 hr before the screw

conveyor is removed for rebuilding. By trying new procedures, and applying a heavier coating of hard-facing material, the maintenance staff hopes to extend the life of the screw. As experience is gained with other plant units and their service lives established, regular rebuilding schedules will be set up for them.

Two men, who are responsible for lubrication, follow a planned schedule of inspection to detect potential trouble and carry out regular procedures. All units requiring fre-

quent or constant lubrications are connected to a centralized lubrication system. Included in the centralized system are: raw-coal screens, bowl desilters, Chance-cone rake, crusher bearings, picking table, centrifugal filters and barge unloader crane.

The Maple Creek maintenance program is provided for in the operating schedule of the plant in that a definite number of maintenance hours has been established. For instance, if the mine operates three shifts, five days per week, the preparation plant is taken off the line for the number of hours set as the standard maintenance time. During this maintenance period, workers perform scheduled changeouts as well as routine maintenance. Most of the plant employees are skilled at maintenance work and help the regular maintenance crew during the shutdown.

To make full use of the available maintenance time, a number of time-saving features are incorporated in the plant. For example, a service elevator speeds handling of materials or parts in the multiple-story structure. A 300,000-cir mil welding cable with taps at convenient locations extends the full length of each conveyor gallery, thus eliminating the need for carrying a welder to these areas. For in-plant welding, 440-V outlets are provided for portable welders.

To save time in repairing major units, small-parts lockers are located throughout the plant. These lockers also store special tools which can be used only on specific units. There are special storage sections for oxygen and acetylene.

All pipe is joined with threadless couplings and lines are planned as straight as possible to eliminate fabrication. An added benefit is increased life, which is made possible by periodically rotating the pipe 90 deg.

The goal of the Maple Creek and Robena maintenance programs has been to prevent major breakdowns. Bearing and shaft difficulties have been discovered before they resulted in serious trouble, and costly motor rewinds have been prevented. As a result of things detected during regular inspection and servicing, management is convinced that preventive maintenance is the most economical type.



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Operator: North American Coal Corporation

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Width 6' 6"
Height 42" (above rails)
Weight 8200 lbs.

Capacity: 395 cu. ft. (level load)
465 cu. ft. (crown load)

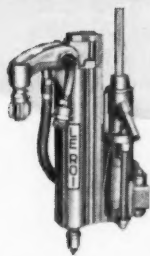
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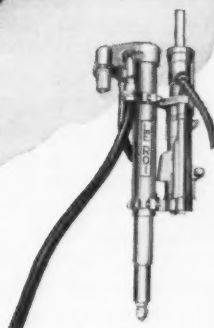
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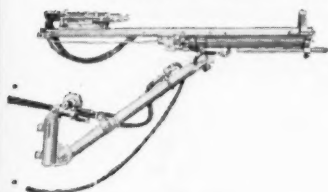
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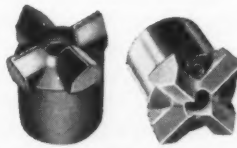
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Development Expense

The present situation from the income-tax angle.

Cardinal points in handling development expenses.

Cases dealing with specific situations.

Donald M. Gamet and Marshall M. Faillace, Arthur Andersen & Co., Kansas City, Mo.

ALTHOUGH the tax consequences of development expenditures are governed by specific statutory provisions, which in many respects parallel the provisions relating to exploration expenditures, the resemblance between them ceases at that point. In contrast to the almost complete lack of court decisions dealing with exploration expenditures alone, the historical background for development expenditures is distressingly plentiful. Unfortunately, its antecedents are so varied and its evolution is spread over so broad a front that it means many things to many people. Herein lies one of the prime sources of misunderstanding.

Much of the difficulty usually experienced in determining the income tax consequences of development expenses can be avoided through a thorough understanding of the different meanings of the term and by an accurate classification of the particular expenditure in question. In this respect, it is important to understand that "development expense" is a broad generic term encompassing at least three separate and distinct concepts, each having different significance for tax purposes:¹

1. Expenditures for development of a mine incurred prior to the production stage.

2. Ordinary development expenses of the type necessary to keep a mine operating at its established capacity.

3. Extraordinary development after a mine reaches the production stage which increases mine capacity, improves the mine, or makes available additional mineral deposits.

Historically, the first type, together with exploration expenditures, were capitalized as part of the depletable cost of the mineral

property.¹ In general, they included all mine expenditures prior to the producing stage except those for depreciable property, though this division was not always clear in those instances in which property usually depreciable in nature becomes an integral part of improvements in depletable property, such as, timbers in shafts or slopes, or rails, pipe lines or transmission lines laid inside the mine.²

The second type, historically, was always deductible as operating expense for tax purposes.³ It is made up of such costs as testing and drilling in advance of the working face, additional shafts needed for ventilation or mine safety requirements, lengthening of haulageways, pit roads, transmission lines, etc., to keep up with the retreating face of the mineral. It is in this category that the distinction between capital expenditures for depreciable property and development expense have become thoroughly confused and at times almost obscured by court cases permitting the cost of equipment to be expensed in those instances where the additional equipment is necessary solely because of the retreating face of the mineral.⁴

Historically, the third type bore some of the attributes of the other two. If the expenditures incurred after the mine reached the producing stage were related to additional or new deposits, they were considered extraordinary development.⁵ If they were of the type usually incurred because of the retreating face, but made the mine more efficient or increased its capacity, they were considered extraordinary development.⁵

The treatment of these extraordinary development expenses was further confused by a little recognized divergence between the position taken by the Commissioner of Internal Revenue and the courts. The commissioner in all of his rulings and

regulations maintained that such expenditures should be deferred and amortized over the units of mineral benefitted by the expenditure and were in addition to the deduction for depletion.⁶ Comments in the reports of the Congressional committees at the time the Revenue Act of 1951 was passed indicate that Congress believed the commissioner's position to represent the law as it then stood (Note 9). However, it appears that no court ever followed this rule, and in at least three court cases extraordinary development expenses were added to the depletable base.⁷

Whether depreciable property was a part of this category is not clear. This was a moot question under the commissioner's position prior to 1951. Since the cost would be capitalized and amortized over the same period in either event, the courts had so confused the matter of depreciable and depletable property that it is difficult to draw meaningful conclusions.

The first statutory consideration of this question came with the passage of the Revenue Act of 1951. The provisions then enacted have been continued almost unchanged as part of the Internal Revenue Code of 1954.⁸ In general, the statute provides that development expenses are deductible. As an alternative, the taxpayer is given an election to defer such expenses on any mine and amortize them as the mineral benefitted is mined.

The statutory provisions are brief and make no attempt to define the terms used. Taxpayers are forced to depend heavily on prior law for definitions and for the understanding of the problem necessary to apply the statute. No distinction is made in the statute among the various categories of development expense discussed here. However, from the statements made in the Congressional committee reports⁹ when the 1951 Act was passed, it seems clear that only the first and third categories are affected. For example, the Senate Finance Committee report states in part:

"During the development stage,

this new subsection is applicable to all expenditures of the taxpayer, unless otherwise excluded herein. However, after the producing stage is reached, it is only those extraordinary expenditures which under existing law must be deferred and deducted ratably as the produced ores or minerals benefitted thereby are sold which are affected by this subsection."

This exclusion of the second category of development expense from the purview of the statutory provisions is extremely significant. It means that with respect to this entire category the case law as established in the pre-1951 cases is still in full force and effect.

The statutory provisions by their terms exclude expenditures for depreciable property. However, the regulations which dealt with the question of development expenditures prior to the Revenue Act of 1951 contained quite similar language.¹⁰ Accordingly, it is not clear how much change, if any, Congress intended to make in the treatment of expenditures for property of a type usually considered as depreciable. The post-1951 regulations¹¹ and Congressional committee reports¹² give no help on this point, so again we must depend on pre-1951 court cases.

Unfortunately, in the cases which have considered the question, the treatment of depreciable mining equipment is very closely related to the treatment of development expense so that most of the cases either fail to draw an ascertainable line between them or have actually confused them to the extent that it is impossible to tell whether expenditures for such property were considered as depreciable or as part of the depletable base.¹³ Historically, both types have been treated as capital expenditures until the mine reached the production stage and thereafter as expense if incurred solely to maintain output. For example, in *Guanacevi Mining Co.*, the court lumped all such costs together, saying:

"The teaching of the opinions in *Marsh Fork Coal Co. v. Lucas* . . . and *Enterprise Coal Co. v. Phillips* . . . impress upon us that if an expenditure is made to attain an intended output, it is properly charged

to capital as a cost of development; if the expenditure is made to maintain an output, it is properly chargeable to operating expense."

No authority is available for drawing a meaningful dividing line between them, and yet it is that line which will frequently determine whether a given expenditure is deductible currently as expense or must be capitalized and depreciated.

In view of the fact that pre-production development expenditures may now be deducted, the line dividing the development stage of a mine from the production stage is no longer of paramount importance. Although there is a difference in the treatment of depreciable property in the first and second types of development expense, the proviso that the cost of depreciable property which increases the value of the mine must be capitalized¹⁴ prevents any advantage from being gained where the production stage is reached prior to the attainment of peak production.

The determination of the beginning of the production stage remains important where the netting of receipts against expense in the pre-production stage will affect the computation of percentage depletion.¹⁵ The statutory provisions and the regulations are not helpful on this point. To the extent it remains important, we must depend on the conclusions reached in the pre-1951 court cases.¹⁶

The treatment of development expenditures is directly related by the terms of the statute¹⁷ to "mine or other natural deposit." Neither of these terms is defined in the IRC. It is not clear in this respect whether the term "natural deposit" is a limiting one or is merely a catch-all to cover those instances in which a mineral might be removed by some method not referred to as a mine (i.e., a quarry).¹⁸ It is clear, however, from the discussions in the Congressional committee reports¹⁹ and in the regulations²⁰ that the important term in most instances will be "mine."

In the judicial history of the subject there seems to have been some tendency on the part of both the courts and the Commissioner of Internal Revenue to equate the terms "mine" and "mineral property."²¹

However, the definitions given to "mineral property" by the courts and by the commissioner were far apart. The commissioner, then as now, contended that each mineral interest in each separate acquisition is a mineral property. The courts seemed to apply in general the test of mining facilities and assigned reserves.

The courts occasionally combined two or more mines as a single "property." It was not always clear whether this was done as a permissive treatment under the regulations²² or as a matter of definition. However, it seems clear that the courts up to now have always found that a "mine" cannot be construed as narrowly as the Commissioner of Internal Revenue construes the term "property."

There is no direct statement in the regulations of the commissioner's position on this specific point. However, in the regulations on the definition of property²³ the term "mine" is defined broadly enough to permit a mine to encompass more than one mineral property. While this definition by its terms relates only to the definition of "property" and, therefore, is not directly applicable to the

1. GCM 13954, CB XIII-2, 66 (1934); *Little Cahaba Coal Co., et al. v. U.S.*, 15 F (2d) 863, 6 AFTR 6387; *Cornellville Central Coke Co. v. Comm'r*, 27 BTA 771; *G. E. Cotton v. Comm'r*, 25 BTA 866.

2. *Alstead Coal Co. v. Yoke*, 200 F (2d) 766, 42 AFTR 1027.

3. *Enterprise Coal Co. v. Phillips*, 84 F (2d) 565, 18 AFTR 173; *Clear Fork Coal Co. v. Comm'r*, 229 F (2d) 638, 48 AFTR 947.

4. *Marsh Fork Coal Co. v. Lucas*, 42 F (2d) 818, 48 AFTR 11046; *Alstead Coal Co. v. Yoke*, 200 F (2d) 766, 42 AFTR 1027.

5. *Roundup Coal Mining Co. v. Comm'r*, 20 TC 388; *Comm'r v. H. E. Harman Coal Corp.*, 200 F (2d) 415, 42 AFTR 970.

6. GCM 13954, CB XIII-2, 66 (1934); Reg. 65, Article 224(a).

7. *Roundup Coal Mining Co. v. Comm'r*, 20 TC 388; *Rephiler Coal Co. v. Comm'r*, 140 F (2d) 554, 32 AFTR 137; *Suckow Borax Mines, P-H TC Mem. Dec.*, par. 53,244.

8. IRC (1939), Sec. 23(cc); IRC (1954), Sec. 616.

9. House of Rep. Rep. No. 586, 82d Cong., 1st sess., Sec. 302 (1951), CB 1951-2, 435, Sen. Rep. No. 781, Pt. 2, 82d Cong. 1st sess. 64, (1951), CB 1951-2, 589.

10. Reg. 111, Sec. 29.23(m)-15.

11. Reg. 118, Sec. 39.23(cc); Reg., Sec. 1.616.

12. See 9.

13. *Guanacevi Mining Co. v. Comm'r*, 127 F (2d) 49, 29 AFTR 66; *Alstead Coal Co. v. Yoke*, 200 F (2d) 766, 42 AFTR 1027; *Clear Fork Coal Co. v. Comm'r*, 229 F (2d) 638, 48 AFTR 947; *Roundup Coal Mining Co. v. Comm'r*, 20 TC 388.

14. Reg. 118, Sec. 39.23(m)-15(a) (2); Reg., Sec. 1.612-2(a).

15. IRC (1954), Sec. 616(b).

16. GCM 13954, CB XIII-2, 66 (1934); *Little Cahaba Coal Co., et al. v. U.S.*, 15 F (2d) 863, 6 AFTR 6387.

17. IRC (1954), Sec. 616.

18. Reg., Sec. 1.611-2.

19. Note 9.

20. Reg., Sec. 1.616.

21. *Black Mountain Corp.*, 5 TC 1117; *Helvering v. Jewel Mining Co.*, 126 F (2d) 1011, 29 AFTR 53; *Rialto Mining Corp.*, P-H TC Memo. Dec., par. 46,148; *Amherst Coal Co. v. Comm'r*, 11 TC 209.

22. Reg. 118, Sec. 39.23(m)-1(i).

23. Reg., Sec. 1.611-1(d) (3) and (4).

statutory provisions on development expenditures, this would seem to indicate that the commissioner does not plan to limit the application of Sec. 616 by a narrow definition of "mine" or "other natural deposit."

The regulations under the 1954 Code provisions pertaining to development expenditures and the regulations under the 1939 Code provisions are in the main a paraphrase of the statute. The only really substantive source of principles are the cases decided prior to 1951, and the principles in these are vague and contradictory. As taxpayers seek to gain the maximum benefits from the present statutory provisions, it seems probable that they will spawn the additional litigation necessary to clarify the principles involved and reconcile the lines of conflict. Until this is done, taxpayers will of necessity operate in an atmosphere of doubt and uncertainty.

Development Cases

1. Bituminous Coal Corp. decides to open a new strip mine during the calendar year. General seam location, coal quality, and deposit extent have been previously determined. In preparation for opening, the corporation built a new tippie and installed equipment necessary for breaking and sizing the coal. It also built 4 mi of permanent haulage road for use throughout the entire mine life, and 3 mi of temporary roads to be lengthened as necessary and used for part of the mining operation, then replaced by other similar roads.

Also built was 4 mi of permanent transmission line to a new substation usable for the life of the mine, plus temporary transmission lines to the actual mining site, these to be extended and moved continuously during property life.

The corporation also drilled the property substantially in advance of the site of initial mining to determine the exact seam location, uniformity, character of the overburden, and all other necessary data. In addition, some grading was done on the area to be stripped, and some large trees were removed. Initial box-cutting was done during the year to the point where the coal was of good quality and contained no excess blossom.

The cost of the tippie, preparation plant, and substation are clearly capital expenditures to be recovered through depreciation.¹ For the transmission line, the answer is not quite so clear, but it is probable that both the permanent and temporary transmission lines should be capitalized as depreciable property.² The remainder of the costs incurred, including permanent and temporary roads, drilling,

grading, tree removal and the initial box cut are all development expenditures,³ and under the statutory provisions may be either expensed for the taxable year in which incurred, or elected to be deferred and amortized as the coal benefitted is mined and sold.⁴

1. Reg. 111, Sec. 29.23(m)-15(b); Reg. 118, Sec. 39.23(m)-15(a) (2); Reg. 1.612-2(a); IRC (1954), Sec. 616(a).

2. *Franklin Coal Mining Co. v. U.S.*, USDC, ND, Alabama, 1932 (unreported), 15 AFTR 860; but see *New Idria Quicksilver Mining Co. v. Comm'r*, 144 F (2d) 918, 32 AFTR 1281; *Alexander and Grant, "Mine Development and Exploration Expenditures," 8 Tax Law Review*, 401, 410 (1953).

3. GCM 13954, CB XIII-2, 66 (1934); *National Lead Co. v. Comm'r*, 23 TC 988; *Hanna Iron Ore Co. v. Comm'r*, P.H. TC Mem., 1953, par. 13, 127, vacated and remanded, USCA 2d, 208 F (2d) 759, 45 AFTR 26; IT 3610, CB 1943, 411.

4. IRC (1954), Sec. 616; Reg., Sec. 1.616.

2. Tunnel Mining Co. operates several deep mines, and during the taxable year opened a new one. This involved sinking three parallel slopes ½ mi long, costing \$1,000,000. Steel beams and timbers and, in some places, concrete walls were required, amounting to one-fourth the total cost. In addition, a bolted main entry was driven through coal 1 mi at a cost of \$100,000 more than the receipts from the coal removed. At the far end, a ventilating shaft was sunk at a cost of \$25,000, and a motor and fan costing \$10,000 were installed.

Rail haulage was chosen, involving electric locomotives and cars. One-and-one-half miles of the line are inside, and the distance from portal to tippie is 7 mi. Belt conveyors were chosen for face-to-main-line haulage, to be extended and moved as necessary. Cost of pipeline and transmission lines inside the mine was \$200,000. Drills, cutters and loaders, roof-bolters, etc., were among the other mine equipment.

Cost of the slopes, main entry and ventilating shaft are clearly development expense subject to the election.¹ It seems almost as clear that the movable equipment—including locomotives and cars, conveyor belts, drills, cutters, loaders, roof-bolters, etc.—are not within the meaning of development expense, but should be capitalized and depreciated.

It is true that in a number of the older cases such items of equipment were not distinguished from development expenses in decisions relating to the overall questions of expensing or capitalizing expenditures.² However, all these cases relate to taxable years before the allowance of percentage depletion and, therefore, in most instances, the court was not required to make a separation of the depletable from the depreciable base. The regulations have at all times indicated an intended separation.³ In 1937, the then Bureau of Internal Revenue ruled on this specific question⁴ and held that the depletable base and depreciable base in a mine are to be kept separate, and depletion and depreciation are to be applied only against the applicable base. Unfortunately the ruling gives no criteria for distinguishing between the two. In two more-recent cases there is recognition that this type of

equipment is to be treated as depreciable property and not as mine-development cost.⁵

The extent of the confusion on this subject is particularly apparent in *Guanacevi Mining*,⁶ U. S. Board of Tax Appeals. The taxpayer during the year in question drove two tunnels into separate ore bodies, built a mill to process the ore and installed certain other operating equipment. With respect to the entire investment, the court held (p 519):

"The expenditure was therefore a capital investment and not an ordinary and necessary expense of operation. . . . To one using the percentage method of depletion, the cost was recoverable through depletion out of income from the property."

Fortunately, there is no other case which extends the depletable base so far, and we can only conclude that the court did not recognize the full import of its conclusions.

Timbers and steel crossbars in the slope, the rail line, and the pipelines and transmission lines offer a more-difficult problem. Again there is no authority directly in point. However, in a number of cases where the taxpayer was required to capitalize such costs because they were incurred during the development stage of the mine, the courts have stated plainly that such expenditures became part of the depletable base.⁷ It is true that the effect of the conclusion does not appear directly in any of the cited cases. However, since all relate to years in which percentage depletion was allowable, the court must have been cognizant of the tax consequences of its holdings.

Although it is difficult to draw broad conclusions, the pattern of these cases seems to be that permanent installations inside of the mine take on the character of the depletable base.

Before we can conclude that the principles developed from these cases are applicable to the statutory provisions relating to development expenditures, we must dispose of the statutory exclusion of depreciable property.⁸ The regulations merely paraphrase this exclusion, but add nothing to its meaning.

It should be noted that this phrase would not have excluded the expenditures in question from the category of development expense had the present statutory provision been in effect when the cases were decided.⁹ Since the expenditures were held to be part of the depletable base, they were obviously not subject to the allowance for depreciation. Furthermore, the Congressional committee reports¹⁰ make it plain that the statutory provisions are intended to secure a deduction for those expenditures which would otherwise be lost because of the effect of percentage depletion. This purpose can only be carried out by including in development expenditures those items which previously became part of the depletable base excepting, of course, the original purchase price of the land and exploration expenditures now treated separately.¹¹

To date, the Internal Revenue Service has not taken a position on this question.

It should be noted, however, that on a similar problem in the definition of intangible drilling and development expense on oil and gas properties, the service has taken the position that expenditures for property usually of a depreciable nature must be treated as depreciable property and excluded from the expenses on which the election can be exercised even though they become attached to the realty in a permanent installation.¹² If the service takes the same position with respect to development expenditures it is certain to cause extensive litigation. In view of the extreme confusion which the courts have previously exhibited, it is impossible to predict the outcome. Certainly, taxpayers pioneering in this field must be prepared to defend their position and to accept, if need be, the changes such litigation may bring.

The rails, pipelines, and transmission lines outside the mine apparently become part of the depreciable base and so are outside the scope of the statutory provisions relating to development expenditures.¹³

1. *Connellsville Central Coke Co. v. Comm'r*, 27 BTA 771; *G.E. Cotton v. Comm'r*, 25 BTA 866; *Franklin Coal Mining Co. v. U.S.*, USDC, ND, Alabama, 1932 (unreported), 15 AFTR 863; *Roundup Coal Mining Co. v. Comm'r*, 20 TC 388; *Guanaeevi Mining Co. v. Comm'r*, 127 F (2d) 49 AFTR 66.

2. *Marsh Fork Coal Co. v. Lucas*, 42 F (2d) 83, 8 AFTR 11,046; *Enterprise Coal Co. v. Phillips*, 12 F Suppl. 49, 16 AFTR 752; *Guanaeevi Mining Co. v. Comm'r*, 127 F (2d) 49, 29 AFTR 66; *Franklin Coal Mining Co. v. U.S.*, USDC, ND, Alabama, 1932 (unreported), 15 AFTR 863; *Winding Gulf Colliery Co. v. Brast*, 13 F Supp. 743, 17 AFTR 320.

3. Reg. promulgated March 5, 1920, Art. 222; Reg. 111, Sec. 29.23(m)-15.

4. GCM 17760, CB 1937-1, 102.

5. *Comm'r v. H. E. Harman Coal Corp.*, 200 F (2d) 415, 42 AFTR 970; *Roundup Coal Mining Co. v. Comm'r*, 20 TC 388.

6. 43 BTA 517, affirmed 127 F (2d) 49, 29 AFTR 66.

7. *Alstead Coal Co. v. Yoke*, 200 F (2d) 766, 42 AFTR 1027; *Clear Fork Coal Co.*, 22 TC 1075, reversed to this—229 F (2d) 638, 48 AFTR 947; *Roundup Coal Mining Co.*, 20 TC 388.

8. IRC (1954), Sec. 616(a): "This section shall not apply to expenditures for the acquisition or improvement of property of a character which is subject to the allowance for depreciation provided in Sec. 167."

9. See the cases cited in Note 7.

10. House of Rep. Rept. No. 586, 82d Cong., 1st sess., Sec. 302, (1951), CB 1951-2; Sen. Rept. No. 781, Pt. 2, 82d Cong., 1st sess., 64 (1951), CB 1951-2, 589.

11. IRC (1954), Sec. 615.

12. Reg. 118, Sec. 39.23(m)-16(c) (1); Mem. 6574, CB 1952-1, 30.

13. *Alstead Coal Co. v. Yoke*, 200 F (2d) 766, 42 AFTR 1027.

3. Advance stripping—Corp. A strips, and near the end of the taxable year, for operating reasons, stripped a substantial way ahead of the loading shovels, expending \$50,000. The year was relatively poor profit-wise and, as a result, percentage depletion from the operation will be limited to one-half net income. A much-better next year is anticipated, with net income large enough so that there will be no limitation on percentage depletion. The company will gain a substantial tax benefit if it is entitled to defer the advance stripping costs and deduct them next year when the uncovered coal is mined and sold. However, it does not wish to take steps which will require it to treat advance stripping costs as deferred expense or as inventory at the end of any subsequent year.

There is no authoritative answer to this question at present. Furthermore, in the few instances in which the deductibility of stripping costs has been at issue before the courts, the implications have been so inconsistent that they provide no firm basis for reaching a conclusion by analogy. As a practical matter, if a taxpayer has no other development costs during the year at a particular mine, he should treat such expenses as though they were covered by the statutory provisions and either deduct or defer them, whichever produces the more advantageous tax consequences. If advance stripping costs are deferred under these circumstances, it should be clearly stated in the return that the deferral is by reason of the annual statutory elections.¹

If there are other development costs incurred during the year at the same time, this also must be taken into account, since the election to defer, if made, relates to all development costs incurred during the year at a specific mine. However, under a properly made election, the right to defer such other development costs would not be affected by a holding that the advanced stripping costs are not development costs for this purpose. Accordingly, it would appear that a taxpayer takes no risk in treating advance stripping costs as development expenditures subject to the election except for interest on the deficiency if this assumption later proved to be incorrect.

At present, there does not appear to be any danger that advance stripping costs will be considered as inventory. At that stage, the mineral is not mined; it has merely been made accessible. There is no authority indicating that such costs are akin to inventory. Rather such meager authority as is available treats stripping costs as akin to other development expenditures.²

The earliest such authority is GCM 13954.³ In stating the question to be ruled on therein, the Bureau of Internal Revenue commented as follows:

"The opinion of this office is requested on the question whether the percentage depletion allowance . . . should be held to provide, in lieu of any other form of deduction, for the return of amounts spent for development (including shaft sinking, tunneling, stripping, etc.) . . . which have been capitalized (a) while the mine is in the development stage and (b) after the mine has reached the producing 'stage.'"

This seems to indicate acceptance that stripping expense is included in the term development cost and that it may relate to the producing stage of a mine. However, stripping is not again mentioned in the ruling. It must also be noted that the significant portion of the quotation is apparently in turn a quotation from the request for ruling and may, therefore, be of no significance as an indicator of the thinking of the Bureau of Internal Revenue at that time.

In IT 3610⁴ the bureau held that the cost of removing the overburden from an ore deposit was a part of the depletable cost of the property recoverable only through depletion.

The next recorded consideration of the

question came in *Hanna Iron Ore Co.*, a Tax Court Memo decision.⁵ Involving a tax year prior to 1951, stripping expense had been deferred and was being amortized over production. The circumstances clearly included what is commonly designated as advance stripping. The IRS contended that a portion of the stripping expense was incurred before the mine reached the production stage, and, therefore, had to be capitalized as part of the depletable base. The service conceded that the stripping expense after that time could be amortized over the benefited production.

Inasmuch as no provision has ever been made in the IRC or regulations with respect to this item, this treatment seems to place it in the category of extraordinary development expense.⁶ As such, it would now be included within the purview of the statutory provisions relating to development expenditures.⁷ On appeal⁸ the 3d Circuit Court of Appeals appears to confirm this conclusion in these words: "If there is no development stage, then the regulation⁹ does not apply to an open-pit mine, and petitioner may treat all pre-production stripping expense as a deferred operating expense to be amortized over subsequent production and sale of iron ore." Although the case was reversed and remanded for rehearing, the sole question to be determined was one of fact: "Was there a production stage?" The Circuit Court apparently agreed with the law as stated in the Tax Court case.

This question was considered again in the *National Lead Co.* case,¹⁰ also involving a taxable year prior to 1951. The taxpayer had expended over \$200,000 in stripping and cutting benches. The ore thus uncovered was all mined in the succeeding 2 yr. The taxpayer deducted the stripping and benching costs when incurred. The IRS contended that part of these costs were incurred while the mine was in the development stage and should be capitalized as part of the depletable base. However, the service agreed that the costs incurred after the beginning of the production stage could be expensed as incurred.

The court found that there was no development stage in the mine in question and permitted the entire cost of stripping and benching to be deducted in the years incurred. Although not an issue in this case, in the facts the court referred to additional development work in a later year. This was apparently additional stripping and benching cost.

The language in the *National Lead* case apparently puts stripping expense during the production stage in the same category as development expenses in other producing mines required to keep up with the retreating face of the deposit.¹¹ If this is true, then advance stripping costs are not included in the type Congress intended to deal with when it passed the Revenue Act of 1951.¹²

Unfortunately, the treatment of post-development-stage stripping costs was not at issue in either case, and accordingly, no authority is given in either for the manner in which that portion of the stripping costs was allowed as deductions for

tax purposes. There is one difference in the facts which might account for the inconsistency in treatment. In the *Hanna Iron Ore Co.* case, the stripping cost involved apparently uncovered the entire deposit, of which less than one-half was mined in the entire period before the court. (This was 2 yr in which stripping was done and two subsequent years.) By analogy to cases involving underground mines this could properly be considered as extraordinary development.¹²

In the *National Lead* case there was also stripping in advance of mining. In the 2 yr in which the stripping at issue was done, enough ore was made accessible to meet mining requirements for these 2 yr and most of the two subsequent ones. However, the court noted that no evidence was introduced by either party to indicate that the cost of mining per ton was any heavier during the period when the overburden was being removed and the benches cut than it was thereafter. It was on this basis that the court held all such costs to be deductible in the year in which they were incurred. Again, in analogous situations involving underground mining, similar costs have been held to be currently deductible.¹⁴

Relating these meager sources of authority to the question of advance stripping leads to the conclusion that a normal amount of advance stripping representing a reasonable and prudent margin of safety in event of breakdown of stripping equipment is deductible currently and not subject to the statutory election to defer.¹⁵

On the other hand, stripping substantially in advance of needs, involving expenditures which would distort production costs of mineral mined during the year, appears to be extraordinary development and as such subject to the annual election.¹⁶

1. A consistent deferral of such expenses without specific election under Sec. 616 IRC (1954) might well give rise to a contention that the taxpayer has adopted a method of accounting to treat such costs as deferred charges akin to inventory.

2. *National Lead Co.*, 23 TC 988, reversed on another issue, 230 F (2d) 161; *Hanna Iron Ore Co. v. Comm'r*, P-H TC Memo. 1953, par. 53,127; 208 F (2d) 759.

3. CB 1934, XIII-2, 66.

4. CB 1943, 411.

5. *Hanna Iron Ore Co.*, P-H TC Memo. 1953, par. 53,127.

6. *Enterprise Coal Co. v. Phillips*, 12 F Supp. 49, 16 AFTR 752, GCM 13954, CB 1934, XIII-2 66; Reg. 65, Art. 224(a) (this provision omitted from subsequent regulations but apparently is still in effect by implication.)

7. IRC (1954), Sec. 616.

8. *Hanna Iron Ore Co. v. Comm'r*, 208 F (2d) 759, 45 AFTR 26.

9. Reg. 111, Sec. 29.23(m)-15(a).

10. *National Lead Co.*, 23 TC 988, reversed on another issue, 230 F (2d) 161, 49 AFTR 218.

11. *Clear Fork Coal Co. v. Comm'r*, 229 F (2d) 638, 48 AFTR 947; GCM 13954, CB 1934, XIII-2 66; Reg. 111, Sec. 29.23(m)-15(a).

12. House of Rep. Rept. No. 586, 82d Cong., 1st sess., Sec. 302 (1951). CB 1951-2, 435; Sen. Rept. No. 781, Pt. 2, 82d Cong., 1st sess. 64 (1951), CB 1951-2, 589.

13. See Note 5.

14. See Note 10.

15. IRC (1954), Sec. 616.

16. See Note 14.

4. General and Administrative Expenses

—X Coal Co., operating other properties, elects to defer all exploration and development expenditures in connection

with a new mine. It maintains an engineering staff to supervise all its mining operations and a substantial general office staff. Part of the engineering-staff time was spent directly in the development of the new mine, but none of the time of the general officers or general staff. In addition, the company incurred interest charges in financing the cost of the exploration and development. It wishes to know whether it should defer some part of the general and engineering supervisory expenses.

In addition to the direct costs involved in exploration and development of the mine, the company should also defer a portion of the salaries of the engineering staff for the time spent directly on the new mine, plus expenses while so engaged. If the engineering staff incurs substantial overhead expenses, it is probable that the IRS will require that an adequate portion of these also be deferred, particularly if a substantial part of the time of the total engineering staff was spent in connection with the development of the mine. No part of the salaries of the general officers and general office staff and no part of the general office expenses should be deferred. These should all be treated as usual and necessary expenses of doing business deducted in the year in which incurred.

There is only one case directly in point involving a mine.¹ In that case the court held that all the usual costs of doing business, including depreciation on office furniture and equipment, would be capitalized as development costs of the mine. However, this finding was based upon a conclusion by the court that during the periods in question the company had no activity other than mine development. In the same case, it refused to allow as development-expenses losses occasioned by embezzlement, stating:

"We think it a fair construction of the meaning of such regulations that expenditures which may be included in the capitalized development costs of a mine must be expenditures made for the purpose of such development. The items involved here had no relationship to the development of petitioner's mine."

Although this does not deal directly with the question of general and administrative expenses, it is not inconsistent, under the facts there involved, with the conclusions outlined above. Despite the fact that there are many other instances in which the courts have required capitalization of development costs of mines, so far as we can find none of the other cases considers the question of general and administrative expenses.

Since this question appears to be quite analogous to the problem involved in research and development expenditures generally, some help can be gained from the cases involving that issue. In a case involving extensive research and development by the *Addressograph-Multigraph Corp.*,² an aliquot portion of the costs of operation experimental and research departments was capitalized as a cost of patents, but apparently only those costs directly involved with these projects were

if ended to be included, and no part of the true general administrative expenses was so capitalized.

The interest is deductible even though incurred in connection with exploration and development.³ As such it is not subject to the elections to defer as exploration and development.⁴ In the event that company capitalized these charges and failed to deduct them, the IRS could take the position that an election had been made to capitalize carrying charges,⁵ and that these charges could only be recovered through depletion. These comments also are applicable to other expenses specifically deductible whether or not connected with a trade or business.

1. *New Quincy Mining Co. v. Comm'r*, 36 BTA 376.

2. *Addressograph-Multigraph Corp.*, P-H TC Mem. Dec., par. 45,058.

3. IRC (1954), Sec. 163.

4. IRC (1954), Sec. 615(a); Reg., Sec. 1.616-1(b) (1) and Reg. 118, Sec. 39.23(cc)-1(a) (2).

5. IRC (1954), Sec. 266 and Reg., Sec. 1.266-1(b).

5. Development by Contractor—A, with leases on undeveloped mineral lands, contracts with B to develop the mineral deposits.

A is entitled to deduct the development expenses incurred by B in his behalf. It is not necessary that the taxpayer incur the development cost directly. He may engage a contractor to make the expenditures on his behalf.¹

The year in which A is entitled to the deduction depends on when the expenditure is paid or incurred. When the amount of outstanding unbilled contracts is material and a reasonable estimate of the liability can be made, good accounting would require that such liability be reflected in the accounts and a deduction allowed to an accrual basis taxpayer. However, payments to contractors in advance of work done may be considered prepayments, with no deduction allowed until the work is actually performed.

The allowance to A should not be limited to strictly agency arrangements. A should be entitled to the election for development expenditures under a so-called "split check" contractual agreement. As long as the owner can show that the expenses were paid or incurred on his behalf he is entitled to treat the proceeds assigned to the contractor as his share of the proceeds of the sale of ore as development expenditures.²

1. Reg., Sec. 1.616-1(a); Reg. 118, Sec. 39.23(cc)-1(a) (2).

2. *Cresson Consolidated Coal Mining & Milling Co. v. Comm'r*, 11 TC 192.

6. Development as Consideration for Partial Interest—A holds a mineral lease already explored and known to contain minerals of quality and in quantity to justify commercial exploitation. However, mine development will require sinking at least two parallel slopes, driving a main entry from which the actual working faces can be developed, and ventilation tunnels, escape tunnels, etc., necessary in an efficient, acceptable underground mine. A

does not have the financial means to develop such a mine.

B has the equipment and organization and agrees to develop the mine to the production stage in exchange for half of the working interest in the mine. B in development work incurs expenditures, including depreciation on his equipment, of \$500,000 during the taxable year.

Under the provisions of the regulations¹ B would be entitled to a deduction for \$250,000 and would be required to capitalize the additional \$250,000 as depletable cost of his one-half interest. The regulations now accord exploration and development expenditures the same treatment as that accorded intangible drilling and development expenditures on oil and gas properties for a number of years, and permit the election granted by Sec. 616 of the IRC of 1954 on all expenditures insofar as they relate to the interest thus acquired by the taxpayer. To the extent the expenditures apply to the remainder of the working interest, however, they must be capitalized as the depletable cost of the portion acquired by the taxpayer.

1. Reg., Sec. 1.616-1(b) (3).

7. Second Development Stage—Corp. A operates one mine with only one shaft for entry. When the mine was constructed 15 yr ago it was planned to operate only the east section of the tract, since conditions in the west section were such that with the equipment and methods then available operation would not have been profitable. However, improved equipment and techniques now make it profitable to mine the west section, in the same seam, from the same shaft. It was decided to start development of the west section during the taxable year 1959.

The development expenditures in the western section will be so great that they will reduce net income of the mine well below the 50% limitation point for computation of percentage depletion, and accordingly about half the tax benefit of the expenditures will be lost if they are deducted currently. Projections indicate that if they are deferred and amortized over future production, net income from the mine will be enough so that the net-income limitation on percentage depletion will not apply.

If the mine remains in the producing stage, the taxpayer will have the right to defer the development expenses in question and amortize them over future production. However, if it re-enters the development stage it may be forced to net income against expense and thus in effect lose the right to defer the development expenditures.

This question is not covered by the Code or regulations and has never been considered by the courts in connection with development expenditures incurred subsequent to the enactment of the special provisions in 1951. The Tax Court in *Clear Fork Coal Co. v. Comm'r.*² held that under similar circumstances the taxpayer's mine did enter a second development stage and was not in a producing

stage at the time the expenditures were incurred.

However, the Tax Court's decision on this point was reversed on appeal.³ The circuit court did not challenge the fact that there could be a second development stage. It cited the definition of development in prior decisions,⁴ which definition is the basis for the definition used in the regulations. The court then concluded that under the circumstances there was sufficient production during the period of extraordinary development to conclude that: "the mine never re-entered the development stage."

The situation in the facts used in this case and as they stood in *Clear Fork* should be distinguished, as the judge did in the appeal in *Clear Fork*, from the situation in those cases where there was no production at all in the period of time during development and preceding the second development stage.⁵ In the cited cases, one involved mining by a different operator and a second involved a mine previously abandoned.

Even if A's mine could be said to have re-entered the development stage, there is substantial doubt that the "net receipts" would reduce the development costs subject to the election to defer and amortize. The "netting" concept arose out of offsetting development expense by the receipts derived from mineral produced in the course of the development which, in effect, represents a reduction of the cost of the development.⁶ Following this reasoning, the coal sold by Corp. A during a second development stage would have no relation to the development activities and, accordingly, should not affect the amount of the expenditures subject to the election.

2. 22 TC 1075.
3. *Clear Fork Coal Co. v. Comm'r.*, 229 F (2d) 638, 48 AFTR 947.
4. *Marsh Fork Coal Co. v. Lucas*, 42 F (2d) 83, 8 AFTR 11046.
5. *Guanacevi Mining Co. v. Comm'r.*, 127 F (2d) 49, 29 AFTR 66; *Alstead Coal Co. v. Yoke*, 200 F (2d) 766, 42 AFTR 1027.
6. *Morrisdale Coal Co. v. Comm'r.*, 97 F (2d) 272, 285, 21 AFTR 362.

8. Equipment Added to Maintain Output During Production Stage—Corp. A strips on one continuous deposit, making the usual parallel cuts across the deposit. It uses 60-ton coal haulers to move the coal from the loading shovels to the preparation plant. As the mining progresses the loading shovels move progressively farther away from the preparation plant. During the tax year it was necessary, because of the lengthened haul, for the corporation to purchase two additional coal haulers.

The corporation should be entitled to deduct the cost of the additional coal haulers. They do not add to the value of the mine nor increase its capacity. They will not decrease the cost of operations. Mining costs will, in fact, increase as the haul continues to lengthen. The additional haulage units are necessary to maintain output solely because of the receding face of the mine.

These expenditures are not within the

scope of the statutory provisions on development expenditures, but appear to fall squarely within the provisions of the regulations which have been virtually unchanged for many years.¹

In general, the regulations permit deductions as ordinary and necessary business expenses for the cost and installation of additions or replacements made necessary by recession of the working faces of the mine, provided the expenditures do not increase the value of the mine, do not decrease unit mining costs, and are not in effect replacements of fully depreciated property. This position is also supported by the rationale of a long line of cases.²

1. Reg. 77, Art. 235 (b); Reg. 118, Sec. 39.23(m)-15(a) (2); Reg., Sec. 1.612-2(a).
2. *Marsh Fork Coal Co. v. Lucas*, 42 F (2d) 83, 8 AFTR 11046; *Winding Gulf Colliery Co. v. Brast*, 13 F Supp. 743, 17 AFTR 320; *Clear Fork Coal Co. v. Comm'r.*, 229 F (2d) 638, 48 AFTR 947; *Roundup Coal Mining Co. v. Comm'r.*, 20 TC 388 (non acq.).

9. Equipment Added to Maintain Output During Production Stage—Corp. A strip mines in a hilly area in which erosion has destroyed the coal in a considerable portion of the valleys and in which a portion of most of the ridges has overburden too deep to remove. In short, the mineable coal lies in a series of fingers which are noncontiguous and are spread over a considerable area.

Due to a series of special circumstances the fingers close to the tippie have been mined in prior years, so that current mining involves a substantially lengthened haul — in an area, however, included in the reserves intended to be mined when the mine was established. Because of the lengthened haul it was necessary for the corporation to purchase two additional coal haulers during the current taxable year.

This case is the same as Case 8 except for the fact that in that case the reserves were in one contiguous deposit and here they lie in a number of noncontiguous deposits. Whether the cost of the coal haulers can be deducted as expense depends on whether these noncontiguous deposits can be included in a single mine as that term is used in the court cases¹ cited in Case 8 and in the regulations.²

This term is not defined in the IRC, nor has it ever been defined in regulations or rulings issued by the IRS pertaining to development expenditures. Although it has been considered in a few instances by the courts,³ the point has not been directly in issue, and consequently the term "mine" has been loosely used without definition or precise connotation. In the *Black Mountain Corp.* case (Note 3) the court apparently equated the terms "mine" and "mineral property;" however, it rejected the commissioner's definition of "mineral property" and concluded that "mineral property" means an operating unit even though some of the reserves were acquired at separate times from separate sellers. (In each instance the reserves were contiguous.)

In *Rialto Mining Corp. and Amherst Coal Co.* (Note 3), the courts held that

two or more mines operated as a single unit could be considered as one property. Again, they seemingly equate "mine" and "mineral property." Again, in both instances, the reserves of each mine included reserves which were separate acquisitions but contiguous.

From these decisions, it appears that a mine is not less than a full complement of operating facilities plus the assigned reserves. The fact that the assigned reserves were all contiguous in each of these cases does not appear to be relevant to the courts' decisions. (In an underground mine the reserves are naturally contiguous.)

This position also is supported by the definition of "mine" contained in the regulations on the definition of property.² It is there defined as:

"... any excavation or other workings or series of related excavations or related workings, as the case may be, for the purpose of extracting any known mineral deposit except oil and gas deposits... The number of excavations or workings that constitute a mine is to be determined upon the facts and circumstances of the particular case, such as, the nature and position of the deposit and deposits, the method of mining the mineral, the location of the excavations or other workings in relation to the mineral deposit or deposits, and the topography of the area..."

This definition seems clearly broad enough to include a number of separate properties, as in this instance. Furthermore, it appears to apply whether or not the taxpayer has made an election to aggregate the properties.³

While these regulations do not directly relate to development expenditures, they contain the only definition of the term "mine" that the commissioner has made to date and seem to be a strong indication that we may expect the term to be broadly construed as it relates to other tax problems of the mining industry.

Accordingly, the operation stated in the facts should be considered as one mine, and the additional coal haulers should be proper expense items when purchased.

1. *Marsh Fork Coal Co. v. Lucas*, 42 F (2d) 83, 8 AFTR 11046; *Winding Gulf Colliery Co. v. Brast*, 13 F Supp. 743, 17 AFTR 320; *Clear Fork Coal Co. v. Comm'r.*, 229 F (2d) 638, 48 AFTR 947; *Roundup Coal Mining Co. v. Comm'r.*, 20 TC 388 (non acq.).

2. Reg. 77, Art. 235(b); Reg. 118, Sec. 39.23(m)-15(a) (2); Reg., Sec. 1.612-2(a).
3. *Morrisdale Coal Co. v. Comm'r.*, P-H BTA Mem. Dec., par. 33,424, aff'd 97 F (2d) 272, 21 AFTR 349; *Black Mountain Corp.*, 5 TC 1117; *Helvering v. Jewel Mining Co.*, 126 F (2d) 1011, 29 AFTR 53; *Rialto Mining Corp.*, P-H TC Mem. Dec., par. 46,148; *Amherst Coal Co. v. Comm'r.*, 11 TC 209.

4. Reg. 118, Sec. 39.23(m)-1(d) (2) and Sec. 39.23(m)-1(f).

5. Reg., Sec. 1.614-3(e).
6. IRC (1954), Sec. 614(c).

10. Equipment Added to Maintain Output During Production Stage—Corp. A is engaged in open-pit mining of lead and zinc ores. Extent and location of the ore body were known before mining was begun. It lies in hilly terrain so that initially the overburden was quite shallow, becoming progressively deeper.

Until the overburden reached 75 ft, one

large shovel was able to handle enough overburden in two steps, and employ a working capacity of the concentrating plant. At over 75 ft, however, it became necessary to cut benches and remove the overburden in two steps, and employ a second stripping shovel (purchased in 1959) operating in tandem with the first to maintain the production rate. On the authority of the regulations¹ the corporation deducted the cost of the second shovel as an ordinary and necessary business expense on its 1959 income-tax return.

Although the problem has been covered generally by the regulations for many years and by a line of cases dating back to the early 1920's, there is no authority on all fours with this situation. It is not within the intended scope of the statutory provisions relating to mine-development expenditures enacted in the Revenue Act of 1951² or in the Internal Revenue Code of 1954.³ In each of these enactments it seems to be specifically excluded by the provisions relating to depreciable property,⁴ and it is the type of expenditure which historically has been associated with development of a mine after the production stage is reached and therefore is outside the intended scope of the statutory provisions.⁵

However, the question does appear to fall within the scope of the general principles developed by the courts.⁶ These principles permit the deduction currently of expenditures for mine equipment if these conditions are met:

1. The additional equipment is necessary to maintain (as opposed to attain) normal output and is required solely because of recession of the working faces of the mine.
2. It does not increase mine value.
3. It does not decrease production cost.
4. It does not represent a cost of restoring property for which depreciation has been allowed.

In this instance it is self-evident that Conditions 3 and 4 have been met. Accordingly, consideration of these conditions will not be included. Anent Condition 1, the expenditure for the second shovel would appear to qualify. Although in all of the other cases in which this matter has been considered⁶ the recession of the face has been primarily horizontal, there is no logical reason why a recession primarily vertical should be different. It is also true that in the decided cases the equipment involved was primarily related to transportation of the mineral rather than to its removal, but again this seems to be an accident of the circumstances involved in those cases rather than a part of the principle involved.

The single decided case which might cast any doubt is *Comm'r v. H. E. Harman Coal Corp.*⁷ In that case the Court of Appeals for the Fourth Circuit denied a deduction of expenditures for additional mining equipment required to maintain production because of a thinning seam.

The court concluded that a change in the deposit was the cause of the expenditure and that, therefore, it could not be said that the expenditure was in effect a charge against the mineral previously removed. Although it might be said that a thinning deposit is analogous to a deeper deposit, the same analogy could also be made to a deposit farther removed from the tippie. Since such analogy would be contrary to recorded cases it is obvious that this is not the *Harman* rationale. The real *Harman* key appears to be the change in the deposit itself as distinguished from its location. Accordingly, it appears inapplicable in this situation.

The second requirement is that the expenditure must not increase the value of the mine. At first blush this requirement is confusing since in any instance the mine is more valuable after the expenditure than immediately before. However, since this is invariably true it is obviously not the test the courts had in mind in enunciating the principle. Although the test is not spelled out in any case it seems apparent that the courts primarily intended to exclude increases in mine capacity by this test. In many instances, also, this test was not separated from the cost-reduction test. In this light, the situation here clearly meets the test. The second shovel will not increase the capacity of the mine and the mine is not more valuable after the addition.

When this situation does reach the courts, unless standards differ from those previously used are applied, the cost of the second shovel should be deductible as an ordinary and necessary business expense in the year the expenditure is made.

Similar situations might be expected to occur with respect to any of the minerals valuable enough to warrant the deep stripping. It might also apply to the mining of metallurgical coal which commands a higher price per ton. However, the gradually diminishing supply of coal and the increasing size of stripping shovels may well introduce this problem into the mining of bituminous coal in the not-too-distant future.

1. Reg., Sec. 1.612-2.
2. IRC (1939), Sec. 23(cc).
3. IRC (1954), Sec. 616.
4. IRC (1939), Sec. 23(cc) (1); IRC (1954), Sec. 616(a).
5. House of Rep. Rept. No. 586, 82d Cong., 1st sess., Sec. 302 (1951), CB 1951-2, 435; Sen. Rept. No. 781, Pt. 2, 82d Cong., 1st sess. 64 (1951), CB 1951-2, 559.
6. *Marsh Fork Coal Co. v. Lucas*, 42 F (2d) 83, 8 AFTR 11046; *Winding Gulf Colliery Co. v. Brast*, 13 F Supp. 743, 17 AFTR 320; *Clear Fork Coal Co. v. Comm'r.*, 229 F (2d) 638, 48 AFTR 947; *Roundup Coal Mining Co. v. Comm'r.*, 20 TC 388 (non acq.).
7. 200 F (2d) 415, 42 AFTR 970, reversing 16 TC 787.

11. Equipment Added to Maintain Output During Production Stage—Corp. A has mined coal from one seam by a slope operation several years. The seam has been thinning. The seam continues through the holding and operation will still be profitable if certain equipment changes are made. To maintain output rate the company during the taxable year replaced its cutting and loading machines with continuous miners. Despite this new equipment the per-ton cost of mining increased.

In similar circumstances, the Court of Appeals for the Fourth Circuit over-ruled the Tax Court and held that such expenditures were capital in nature and could not be deducted when incurred.¹ The court found with respect to the equipment expenditures: "They have been necessitated not by the removal of the coal during the years in which they were made but by the thinness of one of the seams, the radical change in nature of another. . . . They were thus expenditures made in the interest of economy and efficiency and not 'solely because of the recession of the working faces of the mine.'"

This case points up the fact that the critical consideration is not, "Are the expenditures necessary to maintain a level of production?" but is instead, "Are the expenditures in fact necessitated by the removal of coal which results in recession of the working face?"

1. *Comm'r v. H. E. Harman Coal Corp.*, 200 F. (2d) 415; 42 AFTR 970, reversing 16 TC 787.

12. Amortization of Deferred Charges—Deferred mine-development expenditures are to be amortized in the same manner as mine-exploration expenditures. See Case 22 in the section on Mine Exploration Expenditures (*Coal Age*, July, 1961, p. 100).

13. Election to Defer Where There Are Two Openings on The Same Property—Corp. A early in 1958 commenced developing a coal deposit acquired as a single contiguous property. The coal pitches and can be mined economically to an overburden depth of 90 ft by stripping. The remainder of the deposit will be mined by underground methods, using as a main entry a drift from the strip pit. The two operations will be simultaneous for 2 or 3 yr. During the taxable year ended Dec. 31, 1958, the strip mine operated at full capacity, but the underground mine was in the final development stage at year end. Development expenses were incurred in connection with both mines during 1958.

Projections based on the best estimates available indicated that if the two operations were treated as separate properties, the stripping would be profitable enough to earn full percentage depletion of 10% of gross income, but the underground mine would be limited to 50% of net income. If considered as one unit for computing depletion, the operations together would earn the full 10% depletion. Accordingly, the company has not elected¹ to treat the two mines as separate properties.

Development costs for 1958 were:
 Strip mine \$ 50,000
 Underground mine \$200,000
 The 1958 income from mining (both mines) was:
 10% of gross income \$150,000
 50% of net income (before deducting development costs) \$175,000

If all development was deducted, depletion for 1958 would be reduced \$100,000, equal to one-half the development ex-

pensitures on the underground mine. If it were possible to deduct the development costs applicable to the strip mine and defer that applicable to the drift, there would be no reduction in allowable depletion for 1958 and, based on the projections, no loss of depletion in future years by deductions for amortization of deferred development expense.

The regulations² permit A to defer the development applicable to the drift, but deduct the development applicable to the stripping. This is a result of construing "mine or other natural deposit"³ to mean "mine or other natural deposit, whichever is the smaller unit." Although it is not clear what Congress meant when it used these terms, the regulations seem reasonable and seem to carry out the purposes for which Congress enacted the statute. In any event, in the fact situation presented, A has little to lose except the possibility of being forced to defer all defer which Congress enacted the statute, and the regulations⁴ make it clear that the election to defer is for the total expenditures made in that year for the mine or deposit. As amortization of the development on the strip mine would not reduce future depletion, under these facts, A can afford to risk splitting the development costs between deferral and deduction.

This position is also supported by the definition given to the term "mine" in the regulations on the definition of property.⁵ As used therein it seems clear the taxpayer has two mines in this situation. Although this definition is not directly in point it indicates that the commissioner does not intend to construe the term "mine" narrowly or to attempt to equate it with "property."

1. IRC (1954), Sec. 614(c)(2).
 2. Reg. Sec. 1.616-1(c).
 3. IRC (1954), Sec. 616(a).
 4. IRC (1954), Sec. 616(b); Reg., Sec. 1.616-1(c).
 5. Reg., Sec. 1.614-3(c).

14. Carry-Over of Unamortized Deferred Development in Corporate Reorganizations—In 1958 Corp. A acquired operating mines from Corp. B in a statutory merger, and from Corp. C in a transaction in which A acquired all the assets of C in exchange for all of its voting stock. Both transactions were tax-free under the Internal Revenue Code of 1954. All three corporations have reported income for tax purposes on a calendar-year basis.

Corp. B in 1952 and again in 1955 incurred substantial mine-development expenditures. A proper election was made to defer expenditures for both years in total, and the expenditures were amortized over the units of minerals benefited. Corp. C had incurred mine-development expenditures in 1953 and again in 1957, and had also duly elected to defer and amortize. None of the deferred expenditures for mine development expense by either B or C was fully amortized when A acquired the properties.

It is clear that the unamortized expenditures by Corp. B in 1955 and C in

1957 will be deductible by Corp. A as amortization of deferred charges, not depletion, the same as by Corp. B and C.¹

It is also clear that all the unamortized expenditures are to be taken into account in computing the adjusted basis of the mines or deposits for determining gain or loss, abandonment, etc.²

The remaining questions deal only with the right of Corp. A to amortize as deferred expenditures and not depletion the expenditures made by B in 1952 and C in 1953. The carry-over provisions of the Internal Revenue Code of 1954 deal only with expenditures for mine development costs incurred in taxable years to which the 1954 Code applies. The codes of 1939 and 1954 both provide that mine-development expenditures treated as deferred expenses are not to be added to the basis of the property for computing cost depletion.³ Because the property to which the expenditure applies is a wasting asset a deduction of some sort should be available as the asset is used up, and since a deduction for cost depletion appears to be precluded the deferred development should be amortized as a deferred charge.

A somewhat stronger argument can be made for the amortization of the unamortized development expenditures acquired in the merger with Corp. B. The courts have held, and the Internal Revenue Service has ruled, that in a transaction where the identity of the transferor corporation carries through, as in a statutory merger or consolidation, deferred charges of the type similar to development expenditures could be amortized by the transferee corporation.⁴

The same argument may be applicable to the acquisition of the assets of C as a result of a recent court decision involving net operating-loss carry-backs.⁵ The court declined to distinguish the effects of a merger from the effects of other-type reorganizations where, as a practical matter, the effect was the same.

It is obvious, however, that the situation is far from clear with respect to all deferred development costs prior to 1954. Otherwise, Congress would not have felt it necessary to enact Sec. 381(c)(10) of the Internal Revenue Code of 1954.⁶

It seems probable the Internal Revenue Service will contend that this fact alone proves prior law did not allow the amortization of development expenditures by a transferee.

1. IRC (1954), Sec. 381(c)(10).
 2. IRC (1954) Sec. 362(b); IRC (1954), Sec. 616(c) and IRC (1939), Sec. 23(cc) (3).
 3. IRC (1939), Sec. 23(cc)(3) and IRC (1954), Sec. 616(c).
 4. *Helvering v. Metropolitan Edison Co.*, 306 U.S. 522, 22 AFTR 307; *American Gas & Electric Co. v. U.S.*, 17 F Suppl 151, 18 AFTR 901, each dealing with unamortized bond discount; P.S. 62, concerning carry-over of unused pension-plan deductions under IRC (1939), Sec. 23(p).
 5. *F. C. Donovan, Inc. v. U.S.* 261 F (2d) 470, 2 AFTR 2d 6221.
 6. The Senate Finance Committee does not indicate any uncertainty with respect to this question under the Internal Revenue Code of 1939. (See Sen. Rept. No. 1622, 83d Cong., 2d sess., p 282.).

15. Amortization of Deferred Development—Partnership—Corp. A was formed to explore and develop an area believed

to contain a large deposit of low-volatile coal suitable for metallurgical coke. After it had been established that there was sufficient coal to justify commercial operations, preliminary development expenditures of \$200,000 were incurred. To obtain financing for mine construction it was necessary that A obtain commitments for purchase of coal in large quantities. At the time of filing the tax return for the year in which the \$200,000 was spent, it appeared the commitments would not be obtained for at least 5 yr. Accordingly, an election was made to defer and amortize the development expenditures rather than risk deductions loss through the 5-yr limitation on net operating-loss carry-overs.

After A's tax return was filed, Corp. B approached A about acquiring the coal properties. B had supply contracts with steel mills but its own mines could not meet the demand. A and B entered into a joint-venture agreement (partnership for tax purposes), A contributing the partially developed property. The agreement called for a 50-50 split of net income with no special provisions relating to depletion, development, etc.

It is clear that the deferred development is to be taken into account in computing the partnership adjusted basis of the deposit for determining gain or loss.¹ However, it is not so clear whether the partnership will be entitled to amortization of the deferred development costs as the deposit is mined. With respect to the partnership as an entity the problem is the same as that relating to pre-1954 development expenses transferred to a corporation in a nontaxable exchange.²

As to Corp. A alone, the problem is somewhat different. In a partnership the "taxpayer" is not the partnership, but the partner.³ This distinguishes the situation from corporation reorganization and should be decisive in favor of A's right to continue amortizing its portion of the deferral, rather than having it become a part of the depletable base of the property. It is interesting to note that the partnership regulations do not specifically list, as one of the items to be accounted for separately by the partners, mine-development expenditures, although mine exploration is so listed.⁴

1. IRC (1954), Sec. 616(c), Sec. 723.
2. Reg., Sec. 1.616-1(b)(4), Sec. 1.615-1(b)(4); also, see Case 14.
3. IRC (1954), Sec. 701.
4. Reg., Sec. 1.702-1(a)(8)(i).

16. Amortization of Deferred Development—Assignment of Partner's Interest—During 1957, A and B, in a joint venture, incurred mine-development expenditures which they elected to defer and amortize. In 1958, C purchased A's interest. In the partnership return for 1958 an election was made to adjust the basis of partnership property to reflect the purchase price of C's interest in the partnership assets.¹ The adjustment results in an increase in the basis of the mineral property to which the deferred development applied.

This problem also can come about, in

part, through a distribution of property to a partner² with the same results.

There are several problems in this set of facts:

1. Can the partnership increase the amount of deferred development to be amortized?

2. Is Partner C entitled to a distributive share of the amortization deductions?

3. Is Partner B entitled to continue reducing his distributive share of partnership income by amortization?

There appears to be no room in the statute to permit an increase in the amount to be amortized as a deferred expense.³ It cannot be said that the partnership "paid or incurred" additional development costs.

Concerning the second problem, the Internal Revenue Service may take the position that Partner A recovers the remainder of his share of the unamortized mine-development expenditure through the computation of his gain or loss on the disposal of his interest in the partnership. Similarly, it may hold that Partner C is a purchaser of mine development and must, therefore, add his purchased share of the unamortized development to the depletable base of his interest in the mineral properties.

The basis for this contention has been laid in the regulations providing that a partner shall account separately for his share of any partnership item which, if separately taken into account by any partner, would result in an income-tax liability different from that which would result if that partner did not take the item into account separately,⁴ and in the provisions of the code and regulations providing for a separate determination of depletion following an adjustment to basis of any mineral property under similar circumstances.⁵ However, it is far from clear that this is the result intended by Congress.⁶

The election to defer development expense and amortize it as the mineral benefitted is mined appears to be one of the elections to be made by the partner-

ship under the provision of Subchapter K.⁷ The provisions of the regulations and the apparent intention of the Internal Revenue Service to apply restrictions on these elections at the individual level appear to be in conflict with the statutory provisions and may well be held to be invalid by the court. In this event, it would appear that in the fact situation given, the partnership would continue to amortize the deferred development expenditures, thereby reducing the net income to be reported by the partners in their individual return, so that in effect C would receive a deduction for his share of the deferred development expenditures amortized each year after his entry into the partnership.

There would appear to be no possible question about the right of Partner B to continue reducing his income by his distributive share of the amortization irrespective of the position of the Internal Revenue Service on the other question.

As Partner B has not changed his interest in the partnership, there appears to be no valid line of attack against his continuing right to the share of amortization at the rate determined before giving effect to any adjustments to basis of the property.

1. IRC (1954), Sec. 743(b).
2. IRC (1954), Sec. 734(b).
3. IRC (1954), Sec. 616(a).
4. Reg. 1.702-1(a)(8)(ii).
5. IRC (1954), Sec. 743(b), Reg. 1.743-1(b)(2)(iii).
6. House Rept. No. 1337, 83d Cong., 2d sess., Rept. of the Committee on Ways and Means, p. 65. The Senate committee report uses identical language.
7. IRC (1954), Sec. 702(a); Reg., Sec. 1.702-1(a).

17. Sale of Mine on Which Development Has Been Deferred—Corp. A owns a mine on which it has previously deferred \$100,000 in development expenditures. In prior years, \$50,000 has been amortized. A sells the mine to Corp. B during the taxable year.

In computing its gain or loss on the sale of the mine, Corp. A will add the unamortized portion of the deferred development expense at the date of sale to the adjusted tax cost basis of its mine.¹ If all the depletable base has been recovered through percentage depletion, its adjusted tax-cost basis for this purpose will then be the sum of the undepreciated portion of its depreciable mine buildings and equipment and the unamortized deferred-development expenditures.

Corp. B will be required to capitalize the entire purchase price as depreciable or depletable base. It will not be entitled to any deduction for amortization of deferred development expense.²

1. IRC (1954), Sec. 616(c).
2. Reg., Sec. 1.616-1(b)(3) and (4); Reg. 118, Sec. 39.23(cc)-1(a)(2).

[MINE EXPLORATION EXPENSE—The first section of this analysis of exploration and development expenses for tax purposes, covering the exploration-expense phase, appeared in the July, 1961, issue of *Coal Age*, pp 95-101.]

Of Things To Come

The photographs or illustrations appearing on the covers of *Coal Age* usually go with articles in those issues. Not so this month. However, the picture is of a belt unit involved in a major improvement program which will materially cut the cost of production for one of our leading coal producers. What the program is and what it has done will be detailed in full in *Coal Age* late this year or early next after the company has proved it.

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"Duobel" C	165	8,500	Fair	A
"Duobel" D	185	8,000	Poor	A
"Duobel" E	205	7,500	Poor	A
"Monobel" AA	120	9,000	Good	A
"Monobel" A	135	7,400	Poor	A
"Monobel" B	150	7,000	Poor	A
"Monobel" C	165	6,500	Poor	A
"Monobel" D	185	6,200	Poor	B
"Monobel" E	205	6,000	Poor	B
"Lump Coal" C	118 (5)	5,800	Poor	A
"Lump Coal" CC	165	5,700	Poor	A
"Gelobel" AA	102	16,500 (3)	Excellent	A
"Gelobel" C	120	12,100	Good	A

NOTES: (1) Subject to a variation of $\pm 3\%$ from standard
(2) Fired unconfined with own primer, 1 1/4" diameter
(3) Fired unconfined with Straight dynamite primer, 1 1/4" diameter
(4) U.S. Bureau of Mines data
(5) 1 1/2" x 8", since minimum diameter is 1 1/2"

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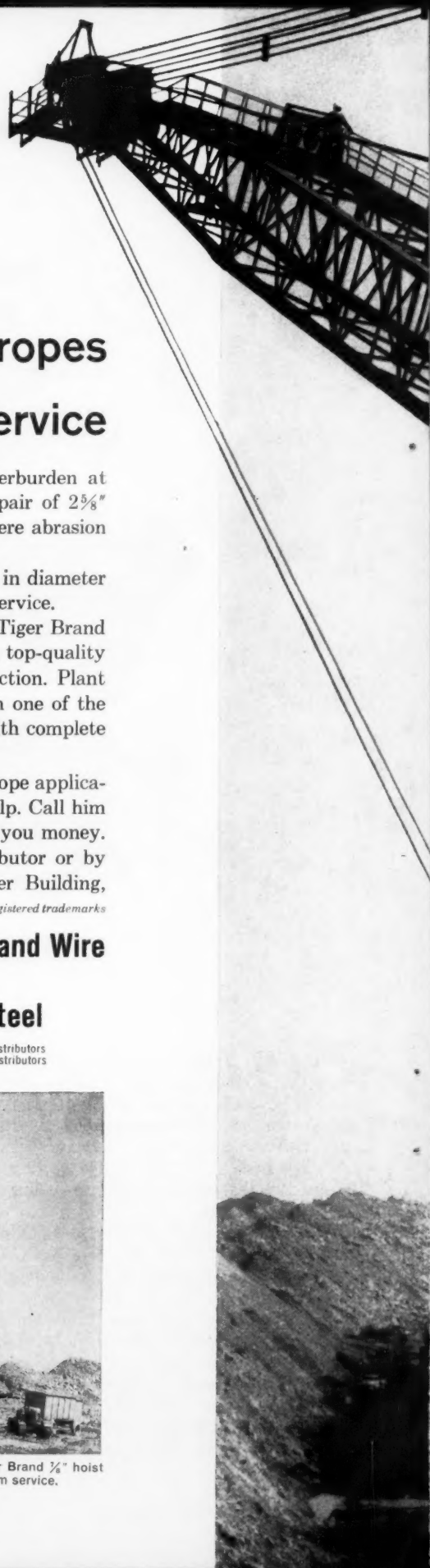
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Alabama, Southern Distributors
United States Steel Export Company, Distributors Abroad

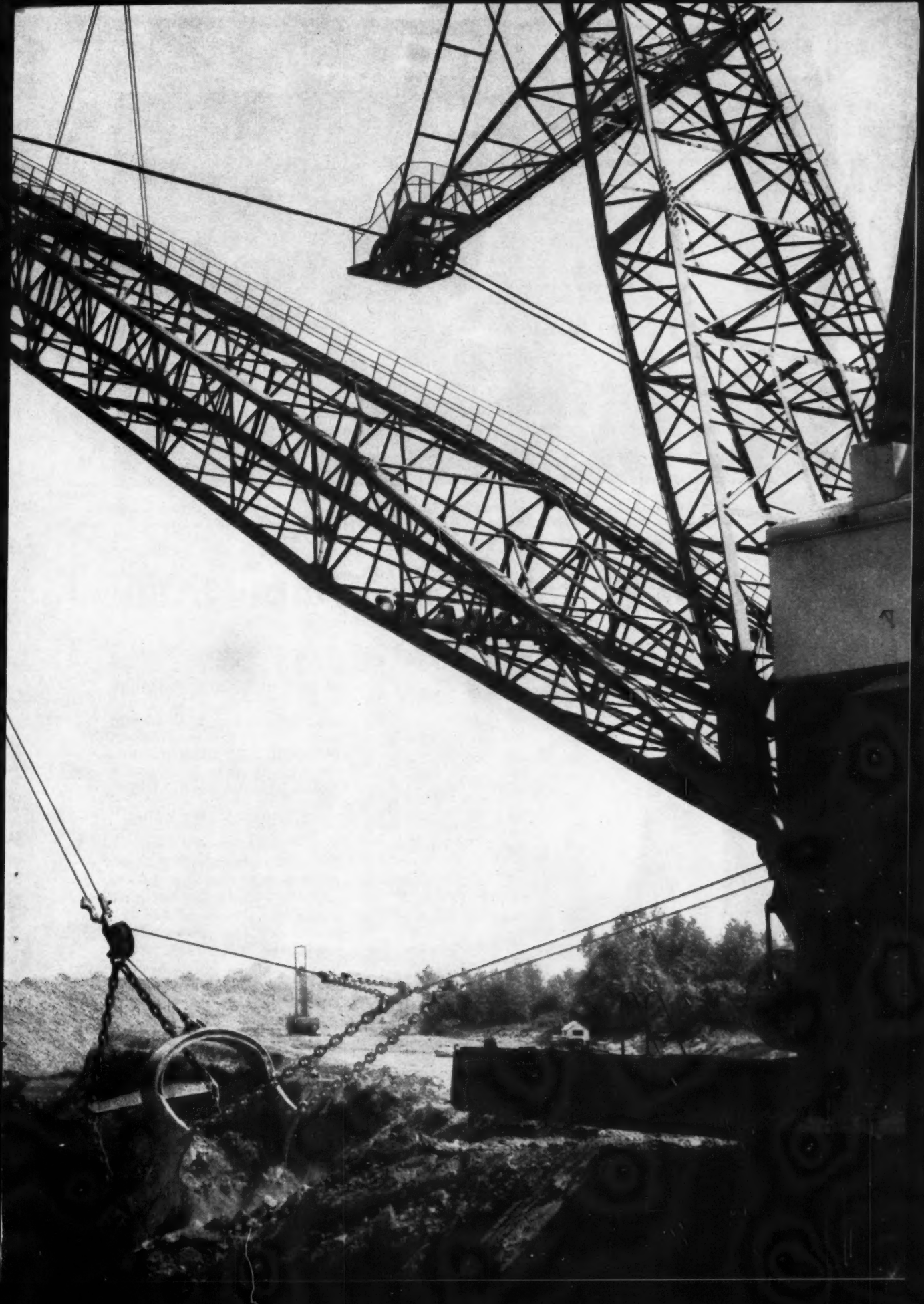


USS Tiger Brand 2½" diameter drag rope provides a good balance of resistance to abrasion and bending fatigue.



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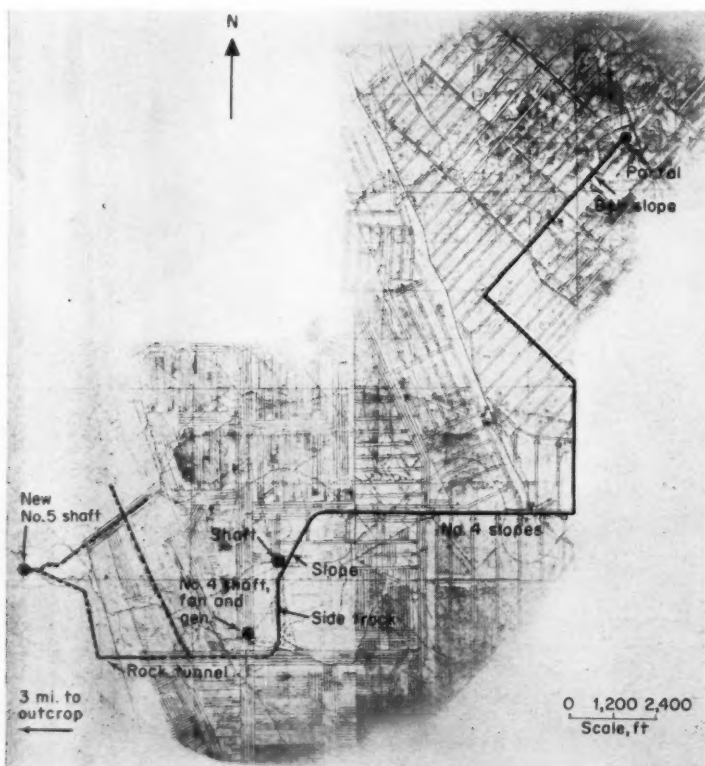






AT END OF SHIFT, men coming to surface have clear path to bathhouse. On-coming men are behind them, waiting to enter elevator from opposite side. Elevator holds 40 men, travels at top speed of 140 fpm.

New Portal Boosts Output 10%,



NEW SHAFT at extreme west end of mine adds 1 hr of productive time per shift by eliminating a 6½-mi underground trip to the working areas.

One-way planned routing of men at \$300,000 facility eliminates congestion and makes it possible to change shifts in 15 min at Woodward Iron's Mulga mine.

A \$300,000 INVESTMENT in new portal facilities adds a full hour of productive time to each shift at the Mulga mine, Woodward Iron Co., Mulga, Ala. The new installation boosts mine output 10%, slashes travel distance to a few thousand feet and improves ventilation.

From the time the men leave their cars in the parking lot until they enter the mantrip cars underground, they move along a one-way route without meeting workers from other shifts going the opposite direction. This planned movement not only eliminates congestion but also makes it possible to change shifts in 15 min.

The men walk from the parking lot to the entrance gate, enter the



NEW PORTAL FACILITIES at Woodward Iron's Mulga mine include a paved parking lot, bathhouse, supervisors' offices, lamp center and pushbutton elevator. Layout is designed to prevent congestion during change of shifts.

Improves Ventilation

change room, pick up their lights from self-service racks and walk to the waiting room next to the shaft.

They descend 215 ft vertically in a Bagby 40-man two-gate push-button elevator traveling at a top speed of 140 fpm. The riders face in one direction and, on reaching the bottom, walk a few steps to a waiting room until mantrip time. Men waiting at the foot of the shaft also have a separate waiting room and enter the elevator from the opposite side. Thus there is no waiting at either level when men enter or leave.

When the men arrive at the surface they are facing the washhouse and the men waiting to go down are behind them on the opposite side of the shaft. As the one group leaves the elevator the other one steps on behind them from the opposite side.

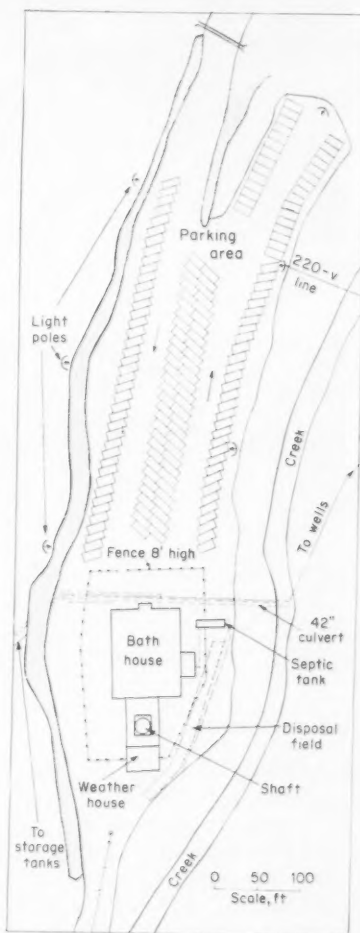
Located at the extreme west end of the present Mulga mine, the new shaft will serve as a portal while some 15 million tons of coal are mined and hauled out the present slope. But in locating and developing the new shaft, the company made an underground layout that would make it possible for the old

workings to the east to be sealed off with bulkheads and a complete new mine developed to the west. To establish the new mine the company would develop a new haulage portal and the present manshaft would serve as an air intake. Management notes that it might be possible to use the new shaft for mining a total of 25 million tons.

Aside from saving an average of 1 hr per shift travel time the new shaft and surface facilities have boosted employee morale. The men now come out of the mine and get into a hot shower only a few minutes after leaving the section and while they are still warm. And they can purchase assorted snacks from self-service dispensers as they leave the washhouse.

The Elevator

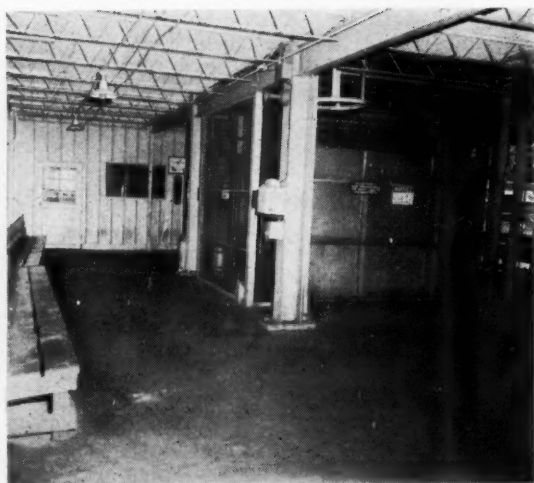
Woodward management selected a Koepe-type AC elevator because of its lower cost and its ability to work effectively in the 215-ft shaft. Capable of carrying an 8,000-lb live load, the elevator is powered by an Imperial 40-hp two-speed 440-V AC reversible motor. It turns over



PLAN of portal features one-way routing of men from parking lot to elevator.



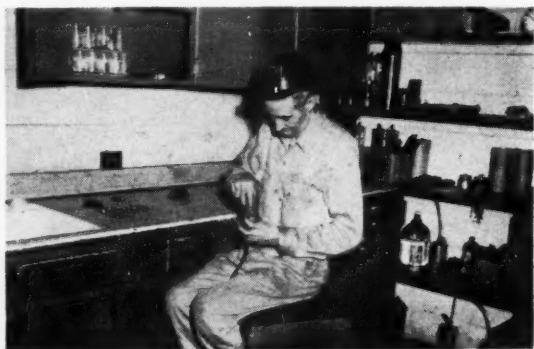
GATE at end of parking lot is the only entrance to the bathhouse and elevator. It is locked over the weekend.



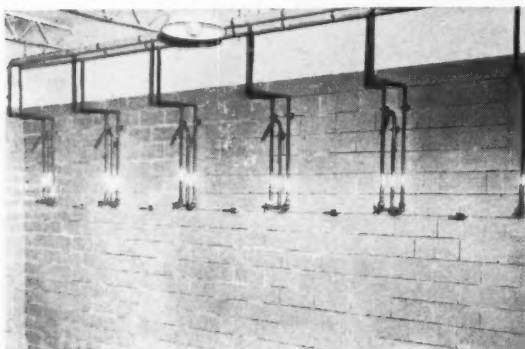
COVERED WALKWAY leads from bathhouse to elevator in foreground and waiting room through door at left.



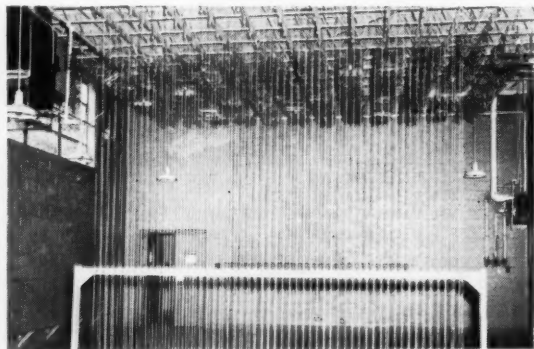
STEEL BUILDING at right provides a heated waiting room for miners and a supply room for small parts.



LAMP-REPAIR ROOM adjoins self-service lamp center where men pick up lights on the way to the elevator.



CHANGE ROOM and tiled shower can handle 216 workers. Building has two of these locker and shower facilities.



at 150 rpm when the start button is pushed and moves the elevator at 22 fpm. It rotates at 900 rpm when elevator speed is 140 fpm.

The elevator platform measures 10 ft 9 in by 7 ft 8 in and has two manually operated counterbalanced gates. These gates require virtually no maintenance and saved \$10,000

in the cost of the 40-man elevator.

To minimize elevator maintenance all controls below the shaft collar are waterproof and totally enclosed. The elevator car is cadmium plated for rust resistance.

Automatic controls always stop the car within ½ in of the landing. When the car is in motion the gates can

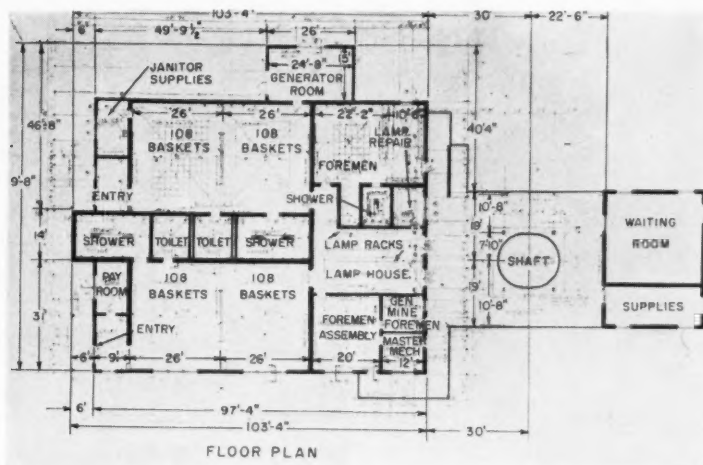
not be opened and when the gates are open the elevator cannot be put in motion.

Planning the Installation

By 1958 Mulga mine had become extended to the point where men had to travel 6 to 6½ mi to the



SURFACING in the elevator are E. P. Smith (left), assistant superintendent; Raymond Baker, general mine foreman; and Dale Shoemaker, safety inspector.



FLOOR PLAN of bathhouse and office provides maximum useful areas while stressing simplified movement of men.

working areas. As a result, there was only about 6 hr of work time available in a shift. Furthermore, the extensive mine workings were becoming difficult to ventilate and a new air shaft was needed. These two factors led management to take steps to sink the new shaft.

Grouting around the new shaft site began in June, 1958. Because of the isolated location, the company had to build an all-weather road 4,600 ft from the Birmingham highway. Work on this road and the initial shaft excavation began in October, 1958. By October 24 the shaft collar was completed to a depth of 10 ft. On Feb. 11, 1959, the shaft broke through to a previously developed underground heading.

The shaft has two 7½-ft-radius semicircular ends, which are connected by 3-ft straight sections. These straight sections of wall provide a smooth surface for anchoring the elevator guides. At a depth of 193 ft the shaft bells out to provide unrestricted flow of intake air when the elevator is at the coal level.

Using slip forms, the contractor placed the concrete liner in the 193-ft straight section of the shaft in one continuous pour. This job took 240 hr, during which 8½ in of liner were poured per hour. It took an average of 2.10 cu yd of concrete per foot of shaft to provide a minimum wall of 12 in. This upper 193 ft of shaft was lined before the lower belled-out section was sunk,

lined and gunited. All steel within the shaft, including elevator guide supports and the escape ladder, was coated with bitumastic paint to prevent corrosion.

Work on the bathhouse-office building and the elevator penthouse began in November, 1959, and by April 1, 1960, all construction was completed. Overall dimensions of the building are 103 ft 4 in by 91 ft 8 in. It is divided into two 52x30-ft change rooms, two 21x14-ft shower rooms, two 14x11-ft toilet areas, a 33x22-ft foremen's locker and change room, self-service lamp-house, lamp-repair room, 20x20-ft assembly room, mine foreman's and master mechanic's offices.

To minimize maintenance as well as simplify cleaning of the building, all walls except the tile shower rooms are constructed of concrete block. The roof is made of precast concrete slabs secured to a truss.

To prevent congestion in the bathhouse, Woodward erected a steel building on the opposite side of the shaft and divided it into a waiting room and supply room. The bathhouse and waiting room are connected by a wide covered walkway which surrounds the elevator shaft.

The building and the elevator are enclosed with a wire fence which has only one open gate when the mine is operating on week days. This open gate leads from the parking lot to the main entrance of the bathhouse and is closed and locked over the weekend. Thus a watchman is not needed.

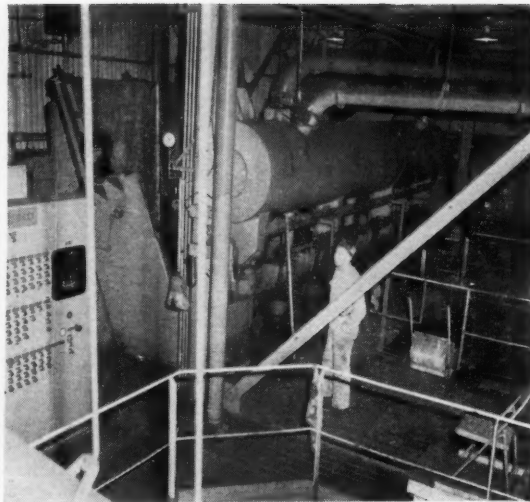
Two deep wells near the parking lot provide water for the bathhouse. Water is pumped to two storage tanks on the hillside above the shaft. After treatment with chlorine the water flows by gravity to the building.

Other Improvements

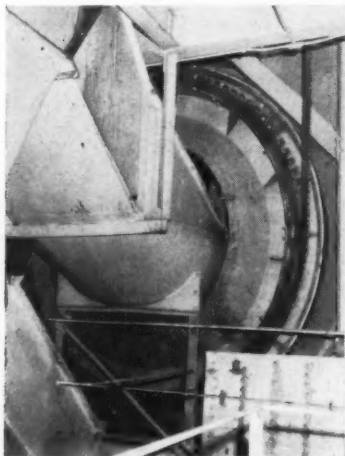
As part of the program of improvements Woodward has recently added a new underground sidetrack for loads as well as extended and improved the mainline haulage. Part of this work included driving a 600-ft rock tunnel between two faults to shorten the haul and improve the track grade. All main haulage roads are constructed with 80-lb or heavier rail.



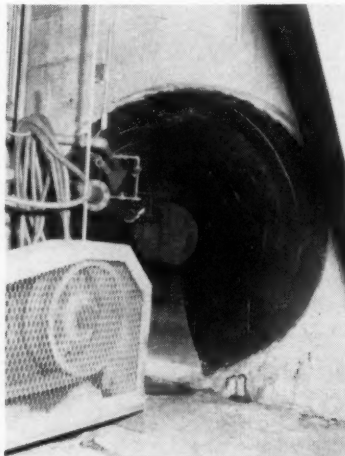
COAL FROM TWO SEAMS is stored separately in two 500-ton storage bins at the Benham preparation plant.



AIR-PULSATED WASHER consists of two compartments and six cells. It handles 400 tph and 5,000 gpm of water.



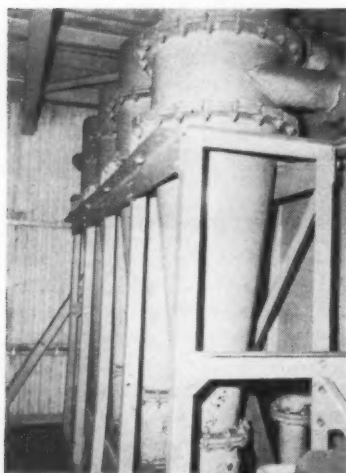
COAL goes to rotary breaker to reduce oversize material and remove rock.



TUNNEL under 70-ft thickener provides access for repairs when necessary.



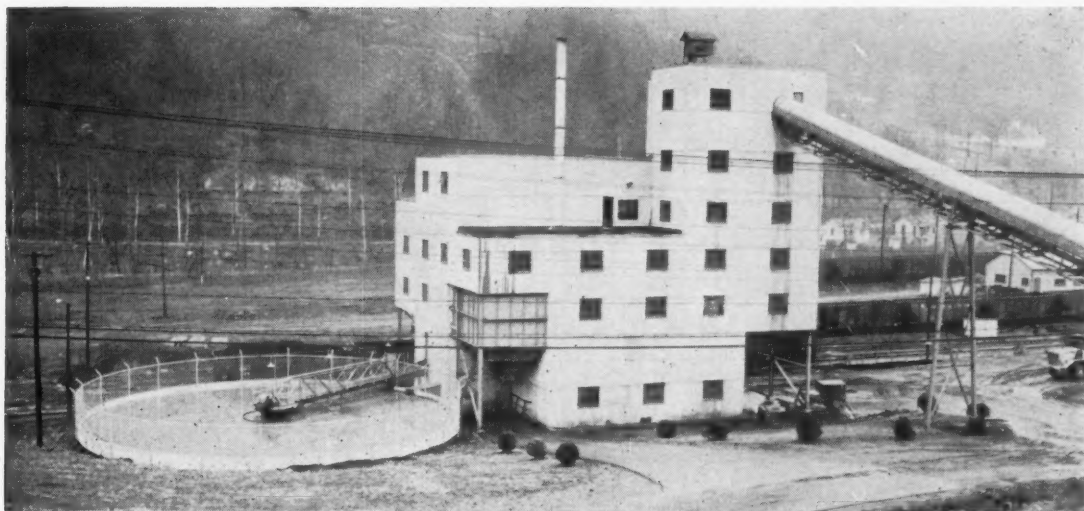
COAL SAMPLES are cut from clean-coal conveyor under belt head.



1/2x0 RAW COAL is thickened in cyclones, then distributed to wet tables.



CHARLES PALMER (right), preparation plant foreman, and Ted Kaylor, coal tester, discuss quality control.



NEW 400-TPH PREPARATION PLANT, characterized by simplicity of design and use of minimum operating equipment, includes coarse- and fine-coal cleaning circuits and a water-clarification system.

Simplicity Marks New Benham Plant

Minimum equipment is used to blend and prepare metallurgical coal from two seams. The one-product plant supplies coking coal for the company's blast furnaces.

THE CHANGING MINING PICTURE at the Benham, Ky., mines of Wisconsin Steel Co., Div. of International Harvester Co., Chicago, has made it necessary to establish new preparation facilities. Until recently, the company mined the "B" and "C" seams located in the heart of the Cumberland mountains. The "C" seam was exhausted, leaving large quantities of "B" and "D" coals. The quality of the "D" seam made it necessary to clean the coal. Coal from the two seams is blended to produce a good metallurgical product, which is shipped to Chicago for coking.

The 400-tph plant was designed and built by the Link-Belt Co. on a turnkey basis. It features coarse- and fine-coal cleaning and a water-clarification system.

Coal from both seams is delivered to the plant in 10-ton 6-door drop-bottom ACF mine cars. An unusual feature of the haulage system at Wisconsin Steel's mines is that coal from the "D" seam, which is approximately 165 ft above the "B," is hauled by mine cars through

the "B." In developing the "D" seam the company sank a shaft to the "B." This shaft serves as a storage bin for the "D" seam, which uses a belt-conveyor haulage system. Conveyors discharge coal into the shaft equipped with an unloading chute at the "B"-seam level for loading mine cars.

Coarse-Coal Cleaning

Coal from each seam is stored in separate 500-ton bins for blending. Each bin is equipped with 42-in wide reciprocating feeders with variable capacities ranging from 150 to 250 tph.

Sixty percent of the "D"-seam coal and 40% of the "B"-seam coal are collected on a 42-in belt conveyor which carries it 227ft—horizontal distance—at a rate of 270 fpm to a height of 64 ft. Coal discharges onto a grizzly bar with 4-in openings. Minus 5-in material is removed. Plus 5-in goes to a 9x16-ft-long McNally Pittsburgh rotary breaker. Coal is reduced to minus 5 in and screened through perfora-

tions in the perimeter of the breaker. Rock is discharged into a 50-ton refuse bin directly under the breaker.

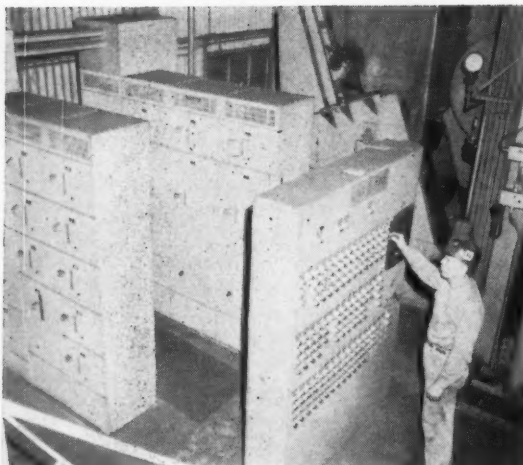
Because of the hardness of the "D"-seam coal, the breaker spirals were removed to permit the coal to remain in the breaker for a longer period so that it would eventually break. With the spirals in, the hard coal would go through the breaker too fast and would be discharged as refuse.

Provisions were made between the grizzly bar and rotary breaker for future takeoff of the plus 5-in material, when the need arises.

The through product from the grizzly and the minus 5-in coal from the rotary breaker are combined and sluiced to a Link-Belt air-pulsated washer. It contains two compartments and six cells. The first compartment has two cells and the second, four cells. The washer processes 400 tph of raw coal and handles 5,000 gpm of water.

Refuse from the first compartment is elevated and conveyed to the refuse bin. Middlings from the second compartment are elevated to a hammer mill crusher and reduced to minus ¾-in for further cleaning. The middlings also can be bypassed and discharged to refuse.

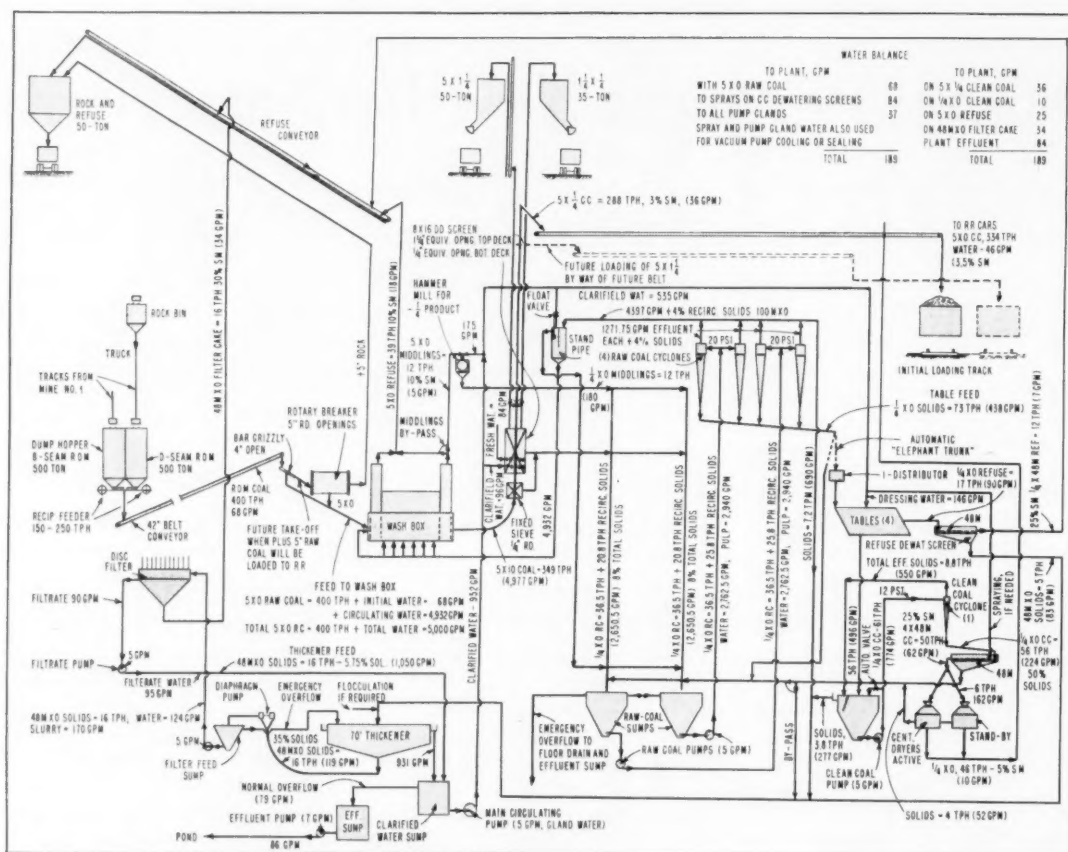
Clean coal from the washer



ALL EQUIPMENT is controlled from one station. Motor-control center and control panel are located near the washer.



20-TON TRUCK is used to dispose of all refuse from the plant. Filter cake is laid on coarse refuse on conveyor.



COAL-FLOW DIAGRAM shows simplicity of various circuits in the plant.

passes over a fixed 1/4-in screen to dump large quantities of water before discharging onto an 8x16 double-deck Lecco dewatering vibrator. The upper vibrator deck is equipped with 1 1/4-in screen and

the lower deck with a 1/4-in screen.

The 1/4x0 product is collected in two raw-coal sumps. The 5x1/4-in product from the upper and lower decks of the vibrator goes by belt conveyor for loading directly into

railroad cars. However, the screens are arranged to produce two sizes (5x1 1/4 and 1 1/4x1/4) for local domestic consumers. The 5x1 1/4 is conveyed to a storage bin and the 1 1/4x1/4 is discharged directly from



Aerial tramway moves a million tons of ore every year

***2½-ton capacity ore cars
ride smoothly on
Bethlehem track strand***

In a rugged section of Oregon's Coast Range, The Hanna Mining Company works the only nickel mine now operating in the United States. On top of Nickel Mountain the ore body lies right on the surface; the open-cut mining method is used.

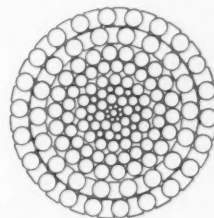
It's 8,300 ft from the loading terminal at the upper level to the smelter stockpile at the foot of the mountain and there's a drop of some 2,000 ft in elevation. A continuous aerial tramway was selected as the most economical way to move the crushed ore downhill over this difficult terrain. The tramway is equipped

with 63 ore cars which carry 2½ tons each. Rated capacity is 250 tons per hour, feeding over a million tons a year to the smelter.

***50,000 ft of large track strand
and wire rope used***

Unlike a monocable aerial tramway, the ore cars ride on *two* pairs of Bethlehem track ropes. The upper pair is 2-in. diameter strand, while the lower is 1½-in. diameter locked-coil track strand. This type of track strand has a smooth surface for the carriage wheels, holding vibration to a minimum as the tram car runs over it. It is designed to resist bending and crushing stresses, too, and takes abrasion remarkably well. Altogether, 16,920 ft of each size

strand is involved, as well as 16,640 ft of 2-in. diameter Bethlehem Purple Strand wire rope for haulage lines.



Half-locked coil strand is designed to be flexible, yet strong. The 2-in.-diam strand has a minimum breaking strength of 218 tons.

If you would like to know more about wire rope for aerial tramways, simply get in touch with the nearest Bethlehem sales office. They'll be glad to give you full details.



for Strength
... Economy
... Versatility

There's a distributor of Bethlehem Rope near you, supplied by our nationwide network of wire rope mill depots.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



MINE-POWER

by Steve Bunish

whose many years of practical experience underground followed by developmental work at Anaconda has made him a recognized authority on mining cables.



Steve Bunish answers your questions on mine cable application and maintenance.

#2: hardening and cracking of cable jackets

Dear Steve,

We have been losing some cable because the jacket becomes hard and brittle. Then cracks develop and we have to replace the cable. Any idea of what may be causing these cracks? And is there anything we can do to prevent this kind of failure?

L.F.P., Pennsylvania

Dear L.F.P.,

Brittle, cracked or crazed jackets indicates a heat problem. When cable insulation and jackets are overheated for long periods of time they tend to grow hard and brittle, and crack when they ought to bend. There are several causes for cable overheating:

1. The conductor is too small, or;
2. Operating voltage is too low, or;
3. Cable length is excessive, or;
4. Overload protection is inadequate or non-operating, or;
5. Cable rating has not been decreased even though there are several layers on the cable reel.

Current rating for cable is based on one cable in air, with nothing near it to prevent removal of heat by the air. When cable is wound on a reel, natural ventilation is no longer sufficient, and the current rating goes down, like this:

One layer	.85 of specified value
Two layers	.65 of specified value
Three layers	.45 of specified value
Four layers	.35 of specified value

You can help lick the heat problem and increase cable life by following these two practices:

1. When you're working near the power source, remove excess cable from the reel to make sure it gets plenty of ventilation;
2. Reverse the ends of the cable periodically, so that the same section is not always exposed to the high temperature normally found near the reel. A good time to do this is when you remove the cable for permanent repairs. Mark the cable ends, and you'll always know which was which.

Steve Bunish will be glad to answer your minepower problem. Simply write it up and send it to "Minepower," c/o Steve Bunish, Anaconda Wire and Cable Company, 25 Broadway, New York 4, N. Y.

See the man from
ANACONDA
for Mining Cables

61299

the vibrator into a secondary bin.

Provisions were made at this point to permit future railroad loading of the 5x1¼ product.

Fine-Coal Cleaning

The ¼x0 product from the raw-coal sumps is pumped to four 24-in low-pressure Heyl & Patterson cyclone classifiers. The thickened underflow, containing approximately 40% solids, is distributed to four Concenco No. 77 double-deck concentrating tables.

Part of the overflow from the cyclones goes to a 70-ft thickener and the larger portion is returned to the washer.

Clean coal from the wet tables is flumed to a clean-coal sump and then pumped to a 24-in cyclone. Overflow is returned to the clean-coal sump. Thickened underflow is discharged onto a 6x16 single-deck Link-Belt dewatering screen for removal of minus 48-mesh material. Plus 48-mesh goes to one of two Reinvelt centrifugal dryers. The second is a spare. Minus 48-mesh is returned to the ¼x0 raw-coal sump.

The centrifugally-dried product is combined with the cleaned 5x¼-in product from the coarse-coal circuit.

Refuse from the wet tables is dewatered and conveyed to the refuse bin.

Water Clarification

Part of the effluent from the raw-coal cyclones and emergency overflow from the raw- and clean-coal sumps, including underflow from the fine-coal dewatering screen and effluent from the clean-coal cyclone, are collected in the 70-ft thickener. Suspended solids are flocculated, raked off the conical bottom and then pumped to a filter-feed sump. Clarified water (overflow) from the thickener is collected in a clarified-water sump for reuse in the plant. Overflow from this sump discharges into an effluent sump and then is pumped to three settling ponds covering an area of 2¼ acres.

The fines solids from the filter feed sump are pumped to an 8-ft 6-in 10-disc Eimco vacuum filter. The filter cake goes to refuse and the filtrate to the clarified water sump.

Basic Tools of Stripping



AUSTIN POWDER COMPANY

Cleveland 13, Ohio

explosives ♦ ammonium nitrates ♦ primers ♦ blasting supplies
detonating fuse and connectors ♦ AP drill heads

Foremen's Forum

Mental Lapses That Kill Men

Errors in judgment, oversights, makeshift repairs, superficial inspections and other human failures have led directly to the deaths of a number of miners and supervisors in coal mines in the recent past.

TAKE TIME to think about safety before acting. Splice cables properly. Block machinery securely before attempting repairs. Treat trips of mine cars with respect. Load materials properly. Warnings like these have been uttered as long as coal has been mined.

Never take the attitude that such admonitions are trite; never let their repetition become nettlesome to you. Men have been killed because they, or someone else, ignored the simple message in these warnings.

The magnitude of the problem may not be striking if one reads reports of single accidents from time to time. But when one reviews a stack of accident reports from the various state mining departments and the Bureau of Mines, he is deeply moved in noting the number of men who lose their lives as a direct result of these oversights.

Without seeking to pinpoint responsibility—nor to wallow in unpleasant incidents—Foremen's Forum offers the following accounts to remind mine supervisors that death is so permanent and that it should not befall anyone because of human failure to observe fundamental safety precautions.

The open safety switch

One report reads as follows:

"The conveyer chain and drive chain on foot shaft of a 14-BU loader broke at the same time. The machine was trammed back to the intersection and blocked with split posts 5 in in diameter under the crawlers, post and cappieces under the head of the machine. Because

the conveyor chain was buckled, it was decided to disconnect the conveyor chain in two places, free the buckled flight and repair the chain in sections.

"The foreman was present during this operation, after which he permitted the repairman to go under the head of the machine. The foreman noted that the machine was securely blocked and reset (safety) switch was in. He then left to visit another section.

"While he was away, it was decided to swing the boom in a better position for repairing chain. The operator swung the boom to the right with the repairman under the head of machine. Leaving the reset (safety) switch open, the operator returned to tail of boom to guide chain into position. The chain was being pulled by a machineman, who had his back turned to the head of the machine, by means of a blasting cable fastened to conveyor chain.

"In pulling the chain the slack in blasting cable caught the tram lever, and, with the reset (safety) switch open the machine trammed backward 3 ft off the blocks and pinned two men underneath head of machine. The injured were freed by raising the head of the machine with a lifting jack."

The accident occurred on Dec. 7, the report says, and one of the men died of his injuries on Dec. 9.

The blind canvas check

In another instance, a shuttle-car operator was injured at work and died 8 days later. His shuttle car was loaded with rock which was to be dumped near

a rock loading machine. The other car came into the coal-loading machine and broke down. As the shotfirer moved out to find the mechanic he found the operator of the rock-loaded car on his back beside the car with both feet in the cab. The victim asked the shotfirer to lift his feet out of the cab and set the brake on the car.

A canvas check had been erected on a crosstimmer where the shuttle car had stopped. From the direction the shuttle car was traveling, the operator could not see location of the post supporting the crosstimmer. From evidence obtained during the investigation, it is believed the victim drove off the shuttle-car runway and was too close to the supporting post. His head was caught between the post, the timber and the back of the shuttle-car seat. He died of his injuries.

The live swing lever

There were no witnesses to this accident, but subsequent tests of the machine involved lead to this description:

A shuttle car was being loaded when the operator of the loading machine decided to advance his machine. He told the shuttle-car operator to move the car away from the loader.

Apparently, unknown to the victim, the discharge end of the boom on the loader was resting on the metal side-board of the shuttle car. The operating level on the loader was in left-swing position and held in this position by the pressure built up as a result of the boom being caught on the side of the car.

For some unknown reason the load-

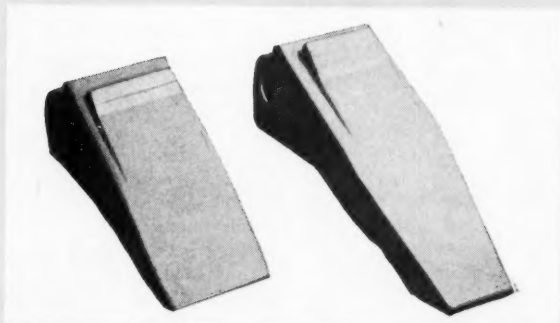
Special report to users of Caterpillar equipment:



Parts you can trust
...cost less per hour

New Cat No. 8 and No. 9 Ripper Tips **outproduce other brands 25 to 50% in field tests**

That's the kind of news you can use—to cut costs. This newcomer to the Caterpillar line of ground-engaging tools is making a name for itself with cost-conscious users.



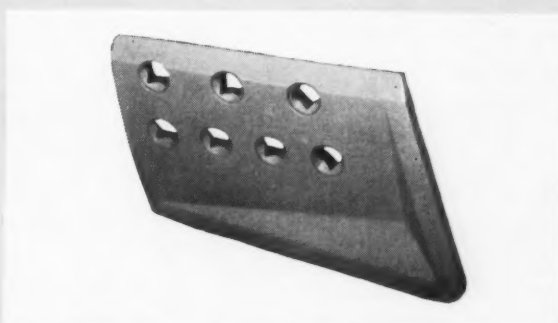
They're available in two new designs. Both the short and long tips shown in the photograph are *self-sharpening* to keep their working edge until replacement. The long tip gives extra wear-life with only a slight reduction in impact strength. Low-cost, weld-on shank adapters are available for *all brands* of shanks. No need to wait—you can put these new Cat Tips on your job immediately.

In field tests the short tip was pitted against two leading brands on rippers working in caliche and cemented conglomerate beds. The Cat Tip outproduced the other brands 25-50%—representing savings of 38-54% in replacement costs.

Outstanding impact strength! One No. 9 Tip, tested in *solid granite*, took 13 smashing blows from another D9 pusher that backed up 10 feet before each charge at the stalled D9 Ripper.

They're exceptionally wear-resistant—hardened to Rockwell C50 for longer wear-life under any conditions.

Check the price! Improved Cat Tips sell for about the same or *even less* than other leading brands.



And here's another money-saving newcomer—Cat's new No. 7, No. 8, No. 9 End Bits are redesigned for better digging ability. They self-sharpen as they wear away for continuing like-new performance. They're forged alloy steel and heat treated for outstanding strength and wear-resistance.

Compare other ground-engaging tool brands against the Caterpillar line. Keep machine-hour records and find out for yourself which is the best buy. Those who do, buy Caterpillar.

See your Caterpillar Dealer for the best in parts and service.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

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Diesel Engines • Tractors • Motor Graders • Earthmoving Equipment

Foremen's Forum (Continued)

ing-machine operator left his position at the controls of the loader to walk toward the discharge end, possibly to release the machine cable which was coiled up and hanging on a board or to notify the buggy operator to pull away. When the shuttle car pulled away the loader boom was released, permitting it to swing toward the coal rib. The loader operator was pinned between the boom jack and the rib and killed instantly.

The sliding highwall

On the day of this strip-mine accident, the victim, who in addition to operating a power shovel also acted as foreman, made an examination of the pit and reported to his superior that it was in safe condition for loading. He began to load coal into trucks. Two trucks had been loaded, and the shovel operator then began to loosen more coal with the shovel. A section of the highwall pulled away and came into the pit, virtually covering the shovel and crushing the operator in the cab. Indications are that no examination was made along the top of the pit.

The hot power line

The victim and four other men were engaged in salvaging electrical equipment at an abandoned colliery. One morning they were unable to start the motor of a winch truck. They decided to tow the winch truck a short distance up a hill using another truck, then attempt to start the engine of the winch truck by coasting downhill in gear.

The truck was towed 150 ft uphill. The victim, who was directing, halted the towing and told the driver of the stalled truck to set his brakes. Then he called for the driver of the tow truck to provide slack in the tow chain.

When he took hold of the chain to uncouple the trucks he was instantly electrocuted. Unnoticed by any of the men, the A-frame of the winch truck was in contact with a 12,000-V power line. Foggy weather contributed.

After the accident both drivers, who fortunately remained in their trucks, were directed to coast downhill far enough to remove the A-frame from the wire. Efforts to revive the victim were unsuccessful.

The lack of clearance

The motor crew was outside the mine to bring a car loaded with timber collars into the mine. The locomotive operator got into his cab and released the brake.

One of the collars in the car caught against one of the timbers at the mine entrance, pushing the collar against the locomotive operator. He was crushed

against the locomotive by the collar.

The operator had 15 yr mining experience. He misjudged the clearance.

Improving the record

As you read the foregoing accident descriptions you can no doubt put your finger on the human failures that contributed directly to the fatalities. However, do not be too hasty in assigning responsibility to a truck driver who failed to see a high-voltage power line, to a motorman who misjudged clearance, to an equipment operator who failed to set a reset button and so on.

Human failures occur at all levels of employment, supervision and management. The victims of these accidents might not have died if they had been working under different safety rules which were rigidly enforced. Making and enforcing rules is a direct responsibility

of management and supervision. Lack of a necessary safety rule and half-hearted enforcement are human failures.

The need, therefore is for cold, calculating safety engineering. If a check curtain of any kind in any place can possibly contribute to a fatality, then the hazard must be engineered out of it. Experience, forethought and action are necessary.

Reports of accident investigations show a number of fatalities each year resulting from circumstances like those above. The best way to lengthen the odds in favor of safety—thereby improving the record—is to apply safety measures, equipment and supervision that will prevent accidents even though human failures occur. If you need a motive, just remember: Death is so permanent!

Wonderful World of Scholarship

WE ARE INDEBTED TO *Hanna Coal News* for wondrous visions and expressions gleaned from the examination papers of young scholars. We suppose that during the school term just beginning teachers will discover many more of these. Here is what youngsters have said . . .

About history

- Nero was a cruel emperor of Rome. He was a great artist, but he was so cruel he killed himself to keep from being killed.

- Julius Caesar was murdered by the ideas of March. As he was dying he looked up and said, "You two brutes!"

- People were first heard of in Egypt and Phoenicia. It was probably their birthplace.

- Rome was overthrown by invasions of the Huns, Visigoths and Osteopaths.

- The motto of the French Revolution was, "Liberty, Equality, Fertility."

- Napoleon presented Josephine with a jewel case which had her entrails engraved upon the lid.

- The Black Death killed so many people that it greatly reduced the popularity of Europe.

- Socrates died from an overdose of wedlock.

- Louis XIV was gelatined.

- Queen Elizabeth was the "Virgin Queen." As a queen she was a success.

- General Braddock was killed in the French and Indian War; he had three horses shot under him and a fourth went through his clothes.

About science

- When we see an object, light passes through the eye and into the brain where little light exists.

- Heredity is a bad thing and ought to be prevented.

- Pasteurized milk comes from the great French doctor, Pasteur. He was French, but now his milk has gone so far that he is really international.

- I can't explain what a vacuum is but I have it in my head.

- Cyanide is so poisonous that one drop of it on a dog's tongue will kill the strongest man.

About English

- The dog came down the path emitting whelps at every bound.

- The king's soldiers were standing at their posts when streams of larva came from the volcano.

- Horseracing is a very cruel sport. At the end of the race the horse drops dead and the rider is pitched into maternity.

- The girl wore a very thin dress and you could see she had a good education.

- The businessman goes home at night very tired and often he cannot get his mind off the drudge at the office.

About general information

- An Indian Reservation consists of a mile of land for every five square Indians.

- A virgin forest is a forest in which the hand of man has never set foot.

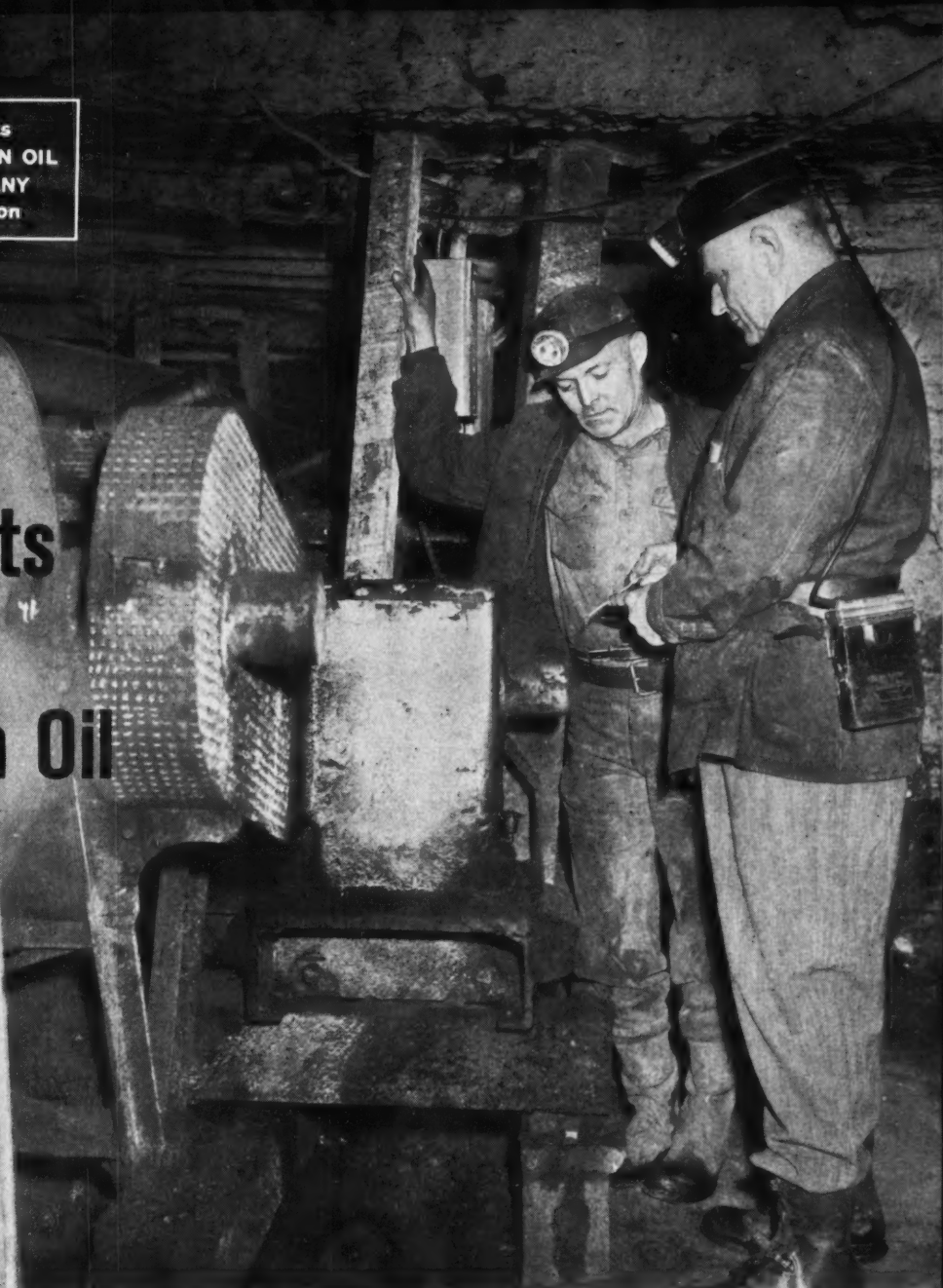
- Zanzibar is noted for its monkeys. The British Governor lives there.

- The people of Japan ride about in jigsaws.



This is
**AMERICAN OIL
COMPANY**
in action

5 products plus American Oil service help this mine run smoothly



Mr. French Richards of the Pitfair Coal Company watches as American's Bob Chrisman checks temperature of conveyor belt lubricant.



By **R. R. (Bob) Chrisman**

About the Author.

Bob Chrisman is a specialist in solving the lubricating problems of mining. Holding a degree in mechanical engineering from West Virginia University, Bob has served commercial customers for 27 years. He has been with AMERICAN OIL COMPANY since 1941.

★ ★ ★

The Pitfair Coal Company operation at Clarksburg, West Virginia, is a "slope" mine, tunneled deeply into the side of a hilly ridge. Throughout the mine itself and at the company's tipple, all equipment—cutting machines, conveyors, truck and loading devices

—are lubricated by American Oil products especially developed for each type of service. The consistent trouble-free performance is one reason why Pitfair has relied on American Oil 100% since 1955.

Another reason is service. Whenever lubrication problems arise, the Pitfair people look to American Oil for helpful technical assistance, and they get it. For example, we recently helped work out a special system for handling the coal spraying operation.

★ ★ ★

You can get the same kind of top quality products and service simply by contacting the AMERICAN OIL COMPANY office nearest you.

Pitfair Mine depends on these American Oil products

- Super PERMALUBE® Motor Oil
- AMERICAN® HQ-M Motor Oil
- AMOCO® Industrial Oil #51
- AMERICAN® Industrial Oil #51
- AMERICAN® Paraffin Oil #8

**AMERICAN
OIL
COMPANY**

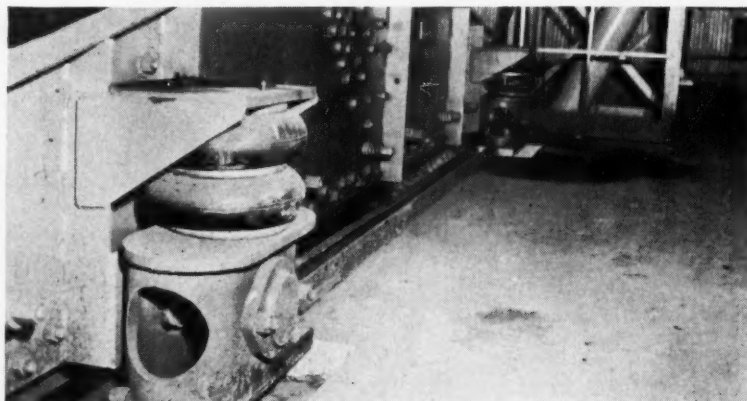


910 SOUTH MICHIGAN AVENUE
CHICAGO 80, ILLINOIS

Operating Ideas

Air-Cushioned Vibrators

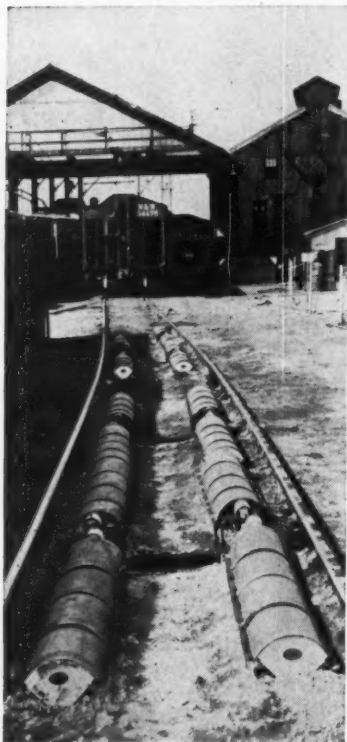
QUIETER, smoother operation results from mounting vibrating screens on air cushions at the Imperial Smokeless Coal Co., Quinwood, W. Va. Each vibrator has two small tires, inflated to 40 psi, mounted at each corner in place of conventional supports. These air cushions are reported to absorb a large percentage of the vibration and sound which are present with other types of supports. This method of support is similar to that used on buses.



New Undercar Heaters Cut Thawing Time Up To 75%

INSTALLATION of a new-type undercar heater at the Colorado Fuel & Iron Corp.'s Pueblo plant cut hopper-car thawing time as much as 75% last winter.

Gas-fired heaters, providing radiant and convection heat simultaneously,



were used to thaw hopper cars of frozen coal. They were designed and built by Hauck Mfg. Co., Brooklyn, N. Y.

The combination of radiant and convection heat has been found to speed up thawing without requiring additional manpower. In some instances thawing time for a two-car train has been cut from 4 hr to one.

At the same time, over-all costs have dropped because demurrage and car damage, common occurrences with the previous thawing method, have been eliminated.

Extensive expansion of the C F & I Pueblo plant has increased the need for steady supplies of coal regardless of the weather. Keeping the coke plant supplied during the winter may require thawing between 50,000 and 60,000 tons in temperatures as low as 20 deg below zero.

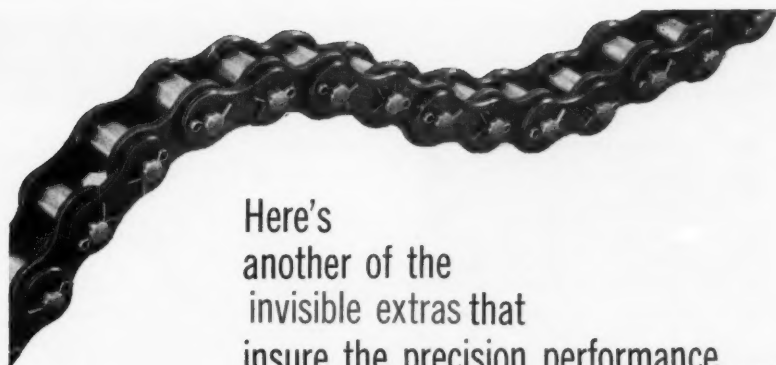
Thawing formerly was done with gas torches placed under the hopper cars. But this method required up to 4 hr to thaw two carloads sufficiently to permit dumping. Demurrage and damage from direct flame impingement often increased costs. To speed up thawing the company installed 16 Radiarc heaters, each rated at 500,000 Btu per hr.

The 16 units are arranged in two groups of eight to make possible simultaneous thawing of two cars. Since this type of equipment requires no permanent foundation, blowers, fans or electric power, installation was a relatively simple matter.



Mobile Lamp Carrier

A MOBILE RACK provides a handy station for men to pick and return flame safety lamps and trip lights at the Mulga mine, Woodward Iron Co., Mulga, Ala. Before each shift the lampman hangs the required number of safety lamps on the outside of the carrier and places trip lights on the shelves. He then wheels it outside of the bathhouse which also houses the lamp-charging station and places it near the door where men entering the mine can pick up their lamps as they go to the elevator. Men returning at the end of the shift deposit their safety lamps or trip lamps on the wheel-mounted unit.



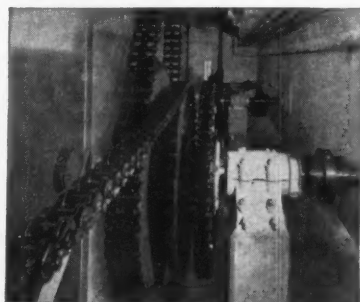
Here's
another of the
invisible extras that
insure the precision performance
of LINK-BELT roller chain



Painstaking precision of heat-treat control gives you uniform strength in every link

To produce roller chain of utmost uniformity, Link-Belt maintains exacting control of all heat-treating processes. With equipment and instrumentation exactly tailored to the need, all processes are carefully adjusted to suit the characteristics of each heat and analysis of steel. Result: roller chain of uniform strength *well above accepted standards*. Chain that absorbs shock loads, delivers full power under continuous heavy going.

Precise heat-treat control is one of many *invisible extras* that contribute



Single and double strand Link-Belt roller chains combine to provide dependable, positive power transmission at this installation.

to the greater strength and endurance of Link-Belt roller chain. Others include prestressing, pitch-hole preparation, shot-peening. These features—plus painstaking precision and inspection in every step of manufacture—assure you of chain that can easily cope with today's heavy loads and high speeds.

For engineering assistance in applying industry's preferred roller chain, contact your nearest Link-Belt office or authorized stock-carrying distributor.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New

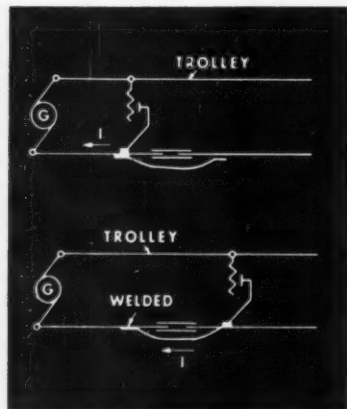
LINK-BELT

ROLLER CHAINS AND SPROCKETS

York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

16,554

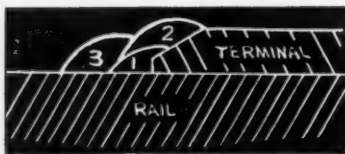
Operating Ideas (Continued)



WRONG welding procedure, shown above, causes welding current to flow through the bond as the second terminal is welded and results in the arc blowing out or makes it difficult to maintain the proper length of arc.



RIGHT welding procedure calls for welding the terminal farthest from the substation first, the terminal nearest last. Welding current never flows through bond with this sequence.



THREE BEADS, laid between rail and terminal in sequence shown in the sketch, make a high-strength, low-resistance bond

Recipe For Better Bond Welding

WHETHER you are baking a cake or welding a rail bond you will get the best results consistently if you follow the recommended procedures, according to *Haulage Ways*, published by the Ohio Brass Co., Mansfield, Ohio. The master bonder, like the master chef, will add a few touches of his own, but he never ignores the fundamentals. The following procedures are offered to help you get consistently good welds.

1. **Clean the rail thoroughly.** A hammer, a cold chisel and a wire brush should be part of every bond welder's

kit. Use the cold chisel to knock off heavy deposits of scale and rust, and the brush to scour off dust, paint and grease until the area to be welded shows bright metal. Both rail and terminal must be clean and dry to produce a solid, non-porous weld with minimum electrical resistance and high mechanical strength.

2. **Use adequate voltage and current.** Steel arc-welding requires about 125 amp for a 5/32-in rod. Under similar conditions, copper arc-welding requires about 200 amp to produce a good weld.

Thus, although the copper weld produces a joint of minimum resistance, the steel arc-weld process has an important advantage when bonds are to be installed some distance from the power source.

The heavier the rod, the more current required: a 5/32-in steel rod requires about 125 amp, while a 3/16-in rod requires about 150 amp.

Best penetration is obtained with a short arc, about 1/8 in long. The short arc also allows less exposure of rod particles to the air, preventing burned metal from being thrown into the weld. Maintaining proper length of the arc is a skill that comes with practice.

3. **Use the proper welding sequence.** The first terminal to be welded to the rail should be the one farthest from the power source. This procedure prevents current from flowing through the bond during welding, in which case an electro-magnetic field around the terminal makes it difficult to maintain the proper arc.

4. **Don't try to finish the job in one pass.** It's important to remember that a good bond requires low resistance as well as high mechanical strength. It's good practice to lay three beads, even though one is sufficient for mechanical strength.

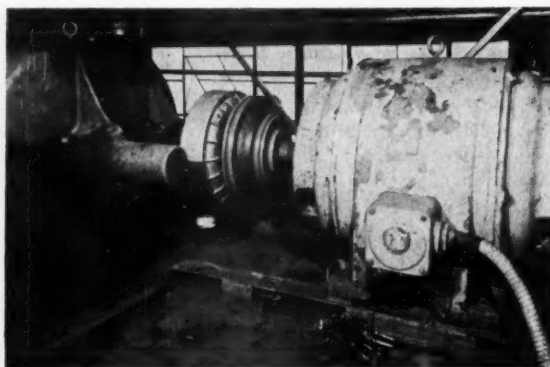
5. **Use a high quality bond.** The cheapest bond is not necessarily the most economical. For instance, you must consider the time it takes to install it, the length of time it remains in service and the resistance it offers to the current in your circuit.

Dry Fluid Cushion Coupling Improves Belt Drive

A DIFFICULT belt-conveyor drive problem at Peabody Coal Co.'s preparation plant in Lynville, Ind., was solved this year with the installation of a new shaft coupling to insure smooth starts for the loaded belt without imposing undue strain on the motor.

After burning out a 150-hp motor because of the length of time required to accelerate the loaded conveyor belt, Chief Electrician Richard Stokes improved the drive by installing a 200-hp 1,200-rpm motor and a 22-in duplex dry-fluid cushion coupling to connect it with the input shaft of a big floor-mounted speed reducer.

The coal conveyor is 600 ft long and 42 in wide with a 12-deg slope. It carries up to 1,200 tph of coal on the top of the tippie for delivery to the crushing system. The new coupling combines a Flexidyne dry fluid cushion coupling with a Dodge Para-flex flexible cushion coupling. This combination absorbs shock, vibration and end float, and compensates



for angular and parallel shaft misalignment. Both are products of the Dodge Mfg. Co., Mishawaka, Ind.

Mr. Stokes reports that acceleration time with the new drive has been cut from 30 sec to 6 to 8 sec and that the overload problem has been eliminated.



The tractor is an International Model R-195, powered by an RD-450 engine. Power is transmitted through a Fuller 5-speed Model 5-A-620, featuring overdrive in 5th gear, and an Eaton 2-speed drive axle.

18 tons . . . 100,000 miles a year

"Our tractors average over 100,000 miles per year, consistently hauling 16 to 18-ton loads, and we get excellent performance from our Fuller Transmissions," states Allan E. Mc-

Garity, Officer of the Harmony Blue Company, Inc. of Elberton, Georgia. "We feel that the reliability of the Fuller Transmissions has been a major factor in the excellent perform-

ance record of our hauling fleet."

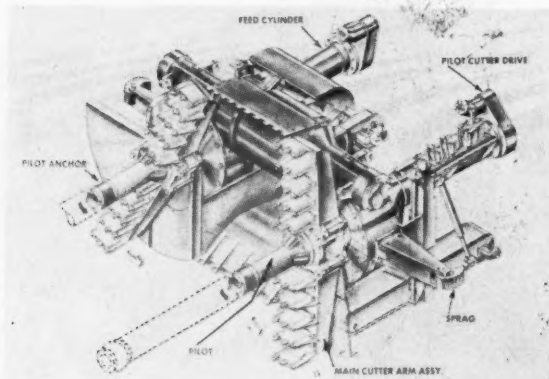
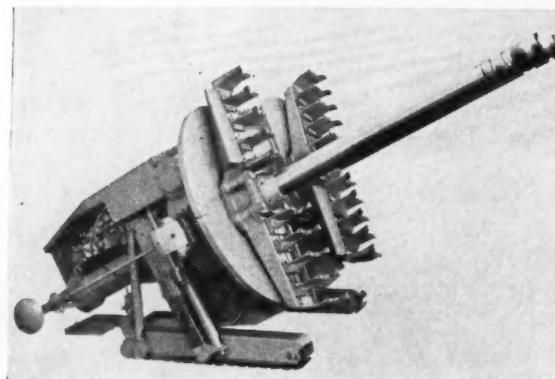
For reliable, low-cost performance in your trucking operation, specify Fuller Transmissions.

See your truck dealer, or write to:

FULLER TRANSMISSION DIVISION
EATON MANUFACTURING COMPANY 
 KALAMAZOO, MICHIGAN

Sales & Service: West. Dist. Branch, Oakland 6, Cal. • Southwest Dist. Office, Tulsa 3, Okla. • Automotive Prod. Co., Ltd., Automotive House, Great Portland St., London W. 1, Eng., European Rep.

New Equipment News



Continuous Miner "Pulls" Itself Forward

Introducing a new "pilot-pull" principle to continuous mining, the Alkirk Cycle Miner can mine coal at the rate of 8 tpm.

This \$150,000 machine literally "pulls" itself forward after the "pilot" (see drawing) anchors itself 7½ ft ahead of the machine in the coal seam. Anchoring can be accomplished by hydraulically expanding a rubber collar at the end of the pilot to the required pressure (as was done effectively in an Alaskan mine where the unit was tested).

Weighing 10 tons, the miner is com-

posed of two 8-in.-dia rotary cutters operating centrally through the hubs of two 7-ft.-dia counter-rotating main cutters, 5½ ft apart, supported in the body of the machine. Pilot cutters, operating at 200 rpm and advancing at rates up to 15 fpm are mounted on the ends of hollow piston rods through which pilot cuttings are carried to the rear. The main cutters are guided on the pilots and pulled into the coal at a rate up to 5 fpm by hydraulic cylinders pulling against the anchored pilot cutters. Equipped with carbide bits, the main cutters

remove the coal by trepanning concentric grooves into the face and breaking the coal between grooves. This coal is forced out through the center of the miner by the machine's forward travel. Cusp cutters trim off the top and bottom.

Hydraulically-powered crawlers, equipped with manually-operated jacks to raise, lower or tilt, can be locked holding the miner for tramping or aligning. The crawlers are free-wheeled while the machine is cutting. Crawler adjustment permits changing vertical alignment upward to 30 deg and downward to 15 deg.

Lawrence Machine & Mfg. Co., 7911 Tenth Ave. South, Seattle 8, Wash.



3-Cone Rotary Rock Bit

The three-cone design of the VQM rotary rock bit permits larger bearings allowing increased weights for drilling harder sections. These cones have somewhat square teeth instead of rectangular

chisel-shaped teeth. This results in maintaining more cross-sectional area at the tooth end during the life of the bit.

In mining, where drilling bits are generally run until 75 to 95% of the tooth is gone, the total footage cut usually is in direct proportion to the amount of tooth metal worn away. But with the VQM bit, more total footage is attained without sacrificing the penetration rate.

Offered in 8¼ and 9-in. sizes, regular or jet, for air or fluid drilling.

Varel Mfg. Co., 9230 Denton Dr., Dallas 20, Tex.

Light Mine Conveyor Belt in Red Color

A polyvinyl-chloride, solid-woven mine-conveyor belt in a distinctive red color has been specifically designed for underground service. It is fire resistant.

Superior, lighter and more uniform belt construction are important advantages gained from new techniques in the controlled-tension weaving. In addition,

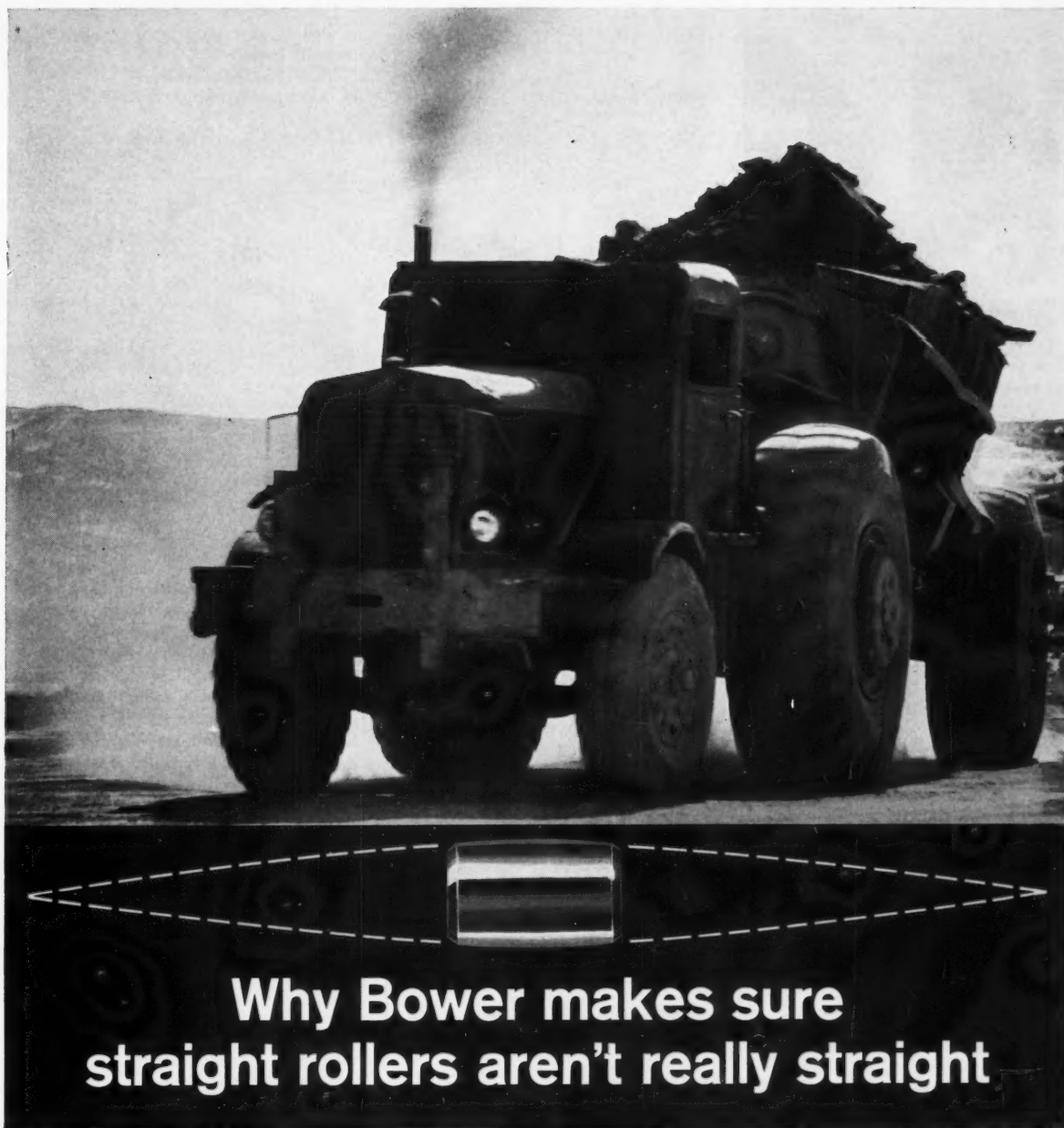
solid-woven nylon and cotton strength member and interlocked weave provide tear resistance and exceptional fastener-holding strength. And the solid-woven edge eliminates ply separation.

Both sides of this completely moisture-proof belt have a PVC cover that make it highly resistant to abrasion. Either side can be used for conveying. Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. Y.

Fuel Conditioner

An ashless organic compound—D-A Diesel Fuel Conditioner—stabilizes fuels in storage and upon contact with the extremely hot injector components of operating diesel engines.

According to the company, test vehicles have operated over 240,000 mi on treated fuel to date and are still in constant use without backflushing or injector maintenance. Other test results show that the conditioner substantially reduces deposits, plugging and gum and lacquer formation on injector compo-



Why Bower makes sure straight rollers aren't really straight

Enormous loads exert crushing pressure on roller bearings—pressure that tires out even the toughest metals.

In a straight roller bearing, this pressure, or stress, builds up at the ends of the rollers. It is called edge-loading. Here, where the metal is subject to severe loads, the first signs of fatigue begin to develop. The result is invariably early bearing failure—expensive downtime for you.

It's for this reason that Bower crowns its straight rollers. Stress is distributed more evenly along the full length of the rollers. Bearings work better, last longer. It adds up to less downtime in the field for you, more of your profit stays in your pocket.

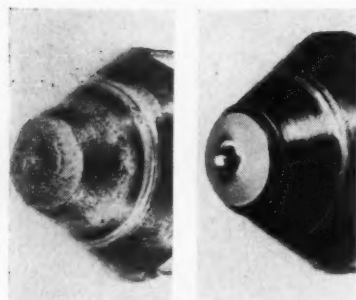
Insist on the best. Insist on Bower. Your jobber can give you full information and fast delivery. Call him today.



BOWER ROLLER BEARINGS

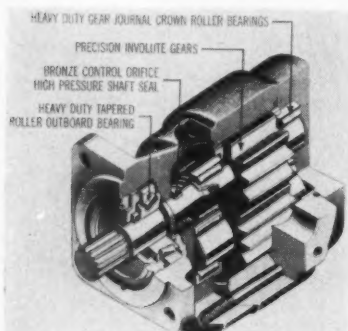
FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICH.



nents, and decreases rust and corrosion in the entire fuel system. In addition, it greatly aided combustion and reduced fuel consumption as much as 10%. One quart treats 875 gal of diesel fuel.

Comparison photos show two injector tips after 70,000 mi of operation. D-A Lubricant was used only on tip at right. D-A Lubricant Co., Inc., 1331 W. 29th St., Indianapolis 23, Ind.



2,500-Psi Gear Pump

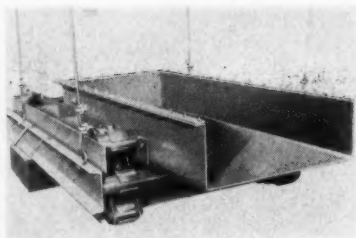
New on the market is the first 2,500 psi continuous-duty-operation fluid-power gear pump offered in three series with output delivery ranging from 7 to 97 gpm at 1,800 rpm.

Complete redesign of the tooth contour of drive and driven gears allows the Model X pump to operate with a greater discharge per inch of gear width than possible on previous models. Another key feature is the entirely new extra-heavy-duty crown roller bearing. Increased load-bearing capacity maintains perfect internal alignment of the pump and results show a greatly improved pump life expectancy. And the new bearings are said to be less susceptible to internal contamination which might enter the hydraulic circuit.

Commercial Shearing & Stamping Co., P. O. Box 239, Youngstown, Ohio

Infinitely Variable Vibrating Feeder

The "Solid Stroke" vibrating feeder is reported to be the first feeder equipped with a solid-drive, variable-eccentric connecting rod which controls

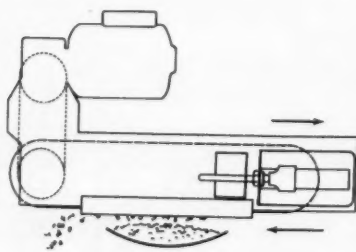


amplitude of stroke and insures constant flow of material at any setting regardless of varying headload.

The variable-stroke eccentric drive provides an infinitely variable rate of feed, from zero to maximum, which can be varied while the feeder is in operation. Once put into motion by the AC electric drive motor, coil springs vibrate the conveying trough at a predetermined natural frequency. Thus, power is regenerated in the springs to start the next stroke, and little additional power is required to keep the trough operating. To aid in this vibrating action, the feeder is balanced. The solid drive connection also provides 50 to 100% greater capacity for a unit of given size than heretofore attained.

Pictured here is the upper trough style. Because this feeder does not require a downhill slope to deliver its tonnage, it may be set at various angles, even uphill, to suit plant layout.

Stephens-Adamson Mfg. Co., Aurora, Ill.



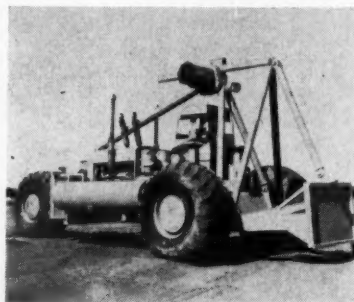
Self-Cleaning Magnetic Separator

For fast, fully-automatic tramp-iron removal or effective concentration of magnetic metals and minerals, the Dings self-cleaning Perma-Plate has been designed.

This magnetic separator is made in three types for suspending over conveyors, chutes or spouts. Magnetic attraction holds iron to the moving cross belt until it is carried beyond the magnetic zone. Here it may be deflected to container or chute as shown in the diagram. No iron can accumulate to interfere with magnetic strength. The full magnetic strength works for you at all times and no manual attention is required for cleaning.

The permanent, nonelectric magnets as well as gear head, motor and drive are fully enclosed.

Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee 46, Wis.

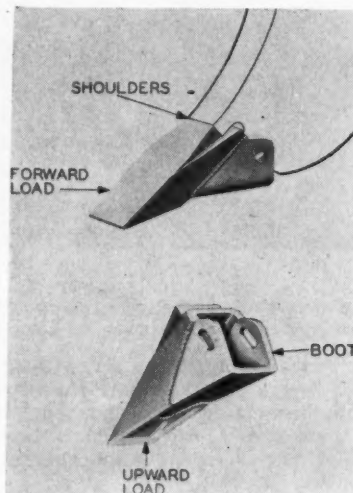


840-Hp Tractor on Rubber

Latest entry in the drawbar derby is an 840-hp tractor on rubber tires which is intended to supplant tandem pushers for loading big-capacity scrapers.

Two diesel-electric generating plants supply power for three electric wheels on the Series K-103 "Pacemaker" tractor. This electric drive combination develops over 90,000 lb of drawbar pull, measured dynamically, according to the company. Built like a tricycle with two wheels forward and one that steers in the rear, it is 42 ft long, 15 ft wide and 16 ft high. Wheels are individually powered, each with its own DC motor and gearing built inside the hub.

R. G. LeTourneau, Inc., Box 2399 S. MacArthur, Longview, Tex.



Improved Ripper Tips and Shanks Are Stronger

Improved design tips and shanks have been developed for Caterpillar No. 8 and No. 9 tractor-mounted rippers.

The tips are of two configurations—

coming and going

every
you take your profits on ~~the~~ run
with the Lee-Norse

BUS & JITNEY



Lee-Norse

MINE PORTAL BUS

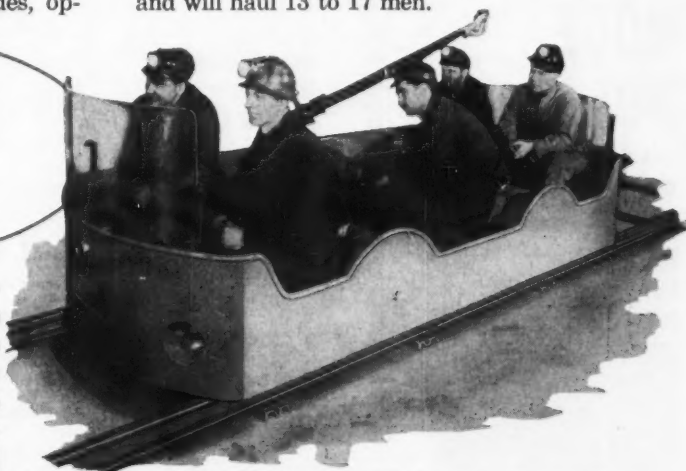
■ There's no wasted motion with this self-propelled Portal Bus because it is fast on the take-off, saving manpower time for conversion into more tonnage. And it is designed for safety, with hydraulic operated running brakes plus mechanical emergency and parking brakes direct on the wheels. For severe grades, op-

tional electric dynamic system produces braking effect from the motor for *extra* safety under all conditions. Also the split roof construction gives operator unimpeded, all directional view, while the trolley pole is always within quick reach. This bus is powered by 15 H.P. motor and will haul 13 to 17 men.

Lee-Norse

MINE JITNEY

■ The Mine Jitney is the "Jack-of-all-Trades" of the mine fleet because its versatility enables it to be used on the regular job and for emergency. It can handle the job of furnishing fast, safe transportation of key personnel, maintenance crews and special groups; and can double up as an ambulance or fire-fighting equipment car. Designed with twin braking systems for added safety. Powered with either



5 or 7½ H.P. motor. Holds up to 7 men comfortably. Optional equipment: Plexiglas windshield, fire extinguisher, stretcher equipment.



Lee-Norse Company

CHARLEROI, PENNSYLVANIA

SPECIALISTS IN COAL MINING EQUIPMENT

one for high-impact applications and the other for use in highly-abrasive material. Fabricated from alloy steel hardened to Rockwell C50, both consist of a forged baseplate and a die-formed wrapper or boot, joined by a high-penetration weld. The abrasion tip provides 75% more wear material than its predecessor and costs a third less. Besides being 3 in longer than the new impact tip, it tapers to a 1¼-in narrower point, is ¾-in thicker and weighs 4 lb more.

The new design shank, called "Speed Shank," embodies a slotted key design for mating tips to shanks. A shoulder on top of the tip butts against a similar surface on the leading edge of the shank, transferring ripping loads to the shank rather than to the tip wrapper and retaining pin.

Caterpillar Tractor Co., Peoria, Ill.

1962 Truck Line

Entry into the diesel field with 15 medium-duty models and introduction of two larger-displacement V-8 gasoline engines highlight the 1962 Chevrolet truck line.

Other improvements include lower hood lines for better road visibility, direction signals as standard equipment and single headlamps for lower maintenance



cost on most models, and longer-life mufflers. Diesel power is supplied by a 130-hp, 212-cu in G.M. two-cycle, in-line, 4-cyl engine. Also new are 327- and 409-cu in gasoline V-8's developing 185 and 252 hp. A 261-cu in 6-cyl engine is newly optional on all light-duty models with manual transmissions except forward control units.

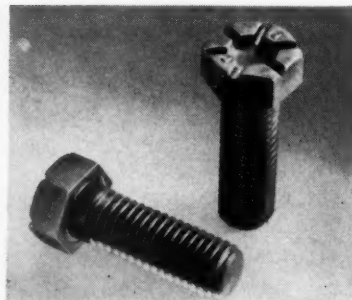
Chevrolet Motor Div., General Motors Corp., General Motors Bldg., Detroit 2, Mich.

Bolt Reduces Fatigue Failure

Pictured above is the one-piece all-metal Place bolt which in recent tests demonstrated its release torque superior

ity over other types of self-locking fasteners, according to its maker.

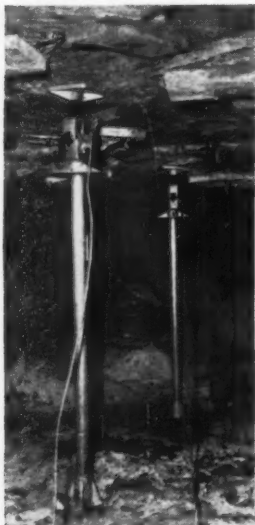
Impact-formed, the Place bolt features in its head design an elastic diaphragm



which furnishes additional elongation when the bolt is tightened. It is formed with six slots in the upper face of the head and a circular recess adjacent to the shank on the seating face. Properly tightened, this bolt markedly reduces the danger of fatigue failure and it is this characteristic of the self-locking feature which guarantees reliability, particularly in shorter bolts. In addition, Place bolts, depending upon size, are reported to be 36% lighter in weight than standard head bolts.

Screw & Bolt Corp. of America, P. O. Box 1708, Pittsburgh 30, Pa.

RECOVER ROOF BOLTS WITH SIMPLEX



ROOF BOLT RECOVERY JACKS (M279)

- two men easily recover 350 bolts per day
- 24" rack bar travel
- high strength aluminum alloy column and castings
- light weight
- 4 sizes for all seam heights—min. height, 48 inches

SAFE, EASY-TO-USE

Place a Jack alongside each of the first row of bolts closest to the face. Raise to the roof to provide temporary support. Remove bolts by auger or pneumatic tool. Stand 25' or more away and pull on a rope attached to the Jack trip lever which collapses the Jack. Move Jack to position under the next row of bolts and proceed as previously.

SEE YOUR DISTRIBUTOR, or write



TEMPLETON, KENLY & CO.
2501 Gardner Road, Broadview, Illinois

WHAT YOU DON'T KNOW HURTS!

Most key mining officials read COAL AGE because it helps them do a better job.

If you're not a regular subscriber, Mail this coupon TODAY

COAL AGE, Fulfillment Manager,
330 West 42nd St., New York 36, N. Y.

Send me COAL AGE for 1 year at \$3 (U.S. and Canada only.)

☐ Check enclosed ☐ Bill Company ☐ Bill me

Name Position

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Mining Company

Hdqs. or Mine Name

To Save Delay, Please Fill Out Completely

CA961

How many? How often?

How come?

YOU **CAN** CUT DOWN THE HIGH COST OF CABLE MAINTENANCE

This is a splice in a trailing cable for a power shovel, dredge, or other mining machine.

It is also a *slice* . . . right out of your profits. Because cable that's in, on its way in, or on its way out of the splicing shop is cable that's not helping you move coal.

How can you minimize it? Sure, mining is tough on a cable. It crushes it. Scrapes it. Drags it. Twists it. Soaks it. The cable hasn't yet been made that can take this kind of treatment for very long without breaking down at some point.

But Rome's SH-D cable is tailor-made to endure these tortures. Compare these features with those of the cable you are now using.

- Auxiliary internal and external shielding tape to mini-

mize excess voltage stress and ionization.

- A choice of either butyl base or oil-base insulation, depending on the kind of protection you need at your mine.
- Rome's unique shielding braid construction—a combination braid of tinned copper and cotton over each insulated and taped conductor—gives added flexibility and longer life to the cable.
- Covered with tough Rome 60 reinforced neoprene jacket to give maximum resistance to abrasion and crushing, moisture, oil, heat and the other hazards.

Ask your Rome Cable representative about our SH-D cable. Or write us for details. Rome Cable Division of Alcoa, Dept. 15-91, Rome, New York.



ONLY FROM PROX



Ends down-time due to failure of set screws, roll pins, rubber retainers, or broken shanks. Results in less inventory, less maintenance.

Round shank exceeds 3 times the back-up area of conventional bits. Incorporates improved aligning—assures perfect match between holder and bit—is easily removed from top or bottom. You get less distortion; positive bit-angle maintained; quicker, more accurate setting; no bit vibration; longer life for carbide.

Bit-Lug designed for QUICK-CHANGE PT-2
—saves \$\$\$\$\$

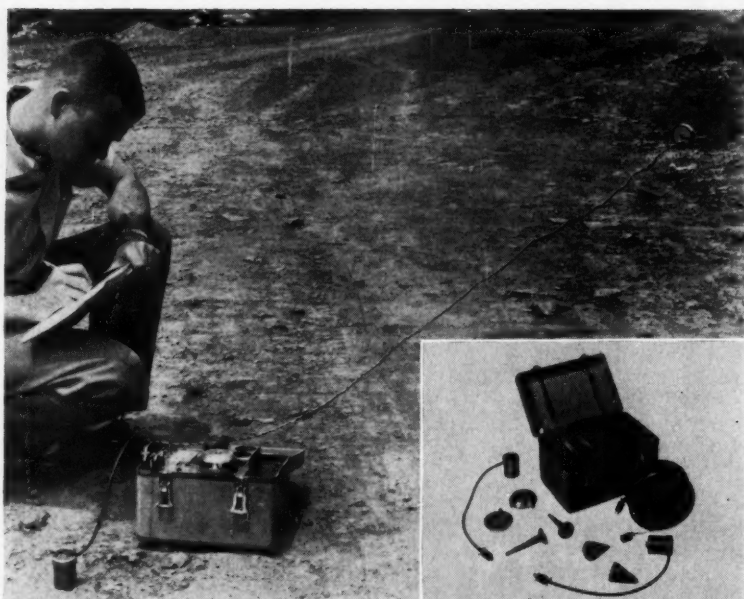


Investigate the complete line of Prox cutting equipment.

PROX

FRANK PROX COMPANY, INC.
TERRE HAUTE, INDIANA

Write for the name of your nearest Prox Sales Representative for complete information.



Unit Quickly Determines Subsurface Conditions

In less than 10 min, a new seismic unit called the "Geochrone" can determine subsurface conditions in stripping operations.

Essentially a battery-operated electronic timer, it consists of two geophone detectors, geophone-mounting bases, 100 ft of geophone connector wire and wire reel, all contained in a sturdy aluminum carrying case, 7x7x11 in, weighing about 16 lb full. A steel plate is also provided.

To set up the unit for operation, place the steel plate firmly on the ground with the J1 geophone adjacent to it. After making necessary electrical hookups, place the J2 geophone a measured distance, such as 10 ft, from the J1. Then

strike the plate with a sledge hammer and observe the time reading. This value will be in milliseconds and should be recorded as the time for propagation over a 10-ft distance. Repeat this sequence several more times, each time placing the J2 geophone an additional 10-ft distance from the J1. The values recorded are all that is required for computing depth to bedrock or other strata.

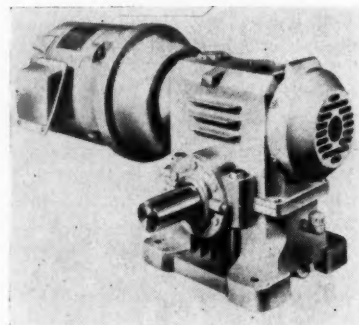
For deeper explorations, mild explosives can be used as a shock source. Complete operating instructions are contained in a handbook provided with every instrument. National Electronics Div., Thiokol Chemical Corp., 1713 Kalorama Rd., N.W., Washington 9, D. C.

Motor Reducer Features New Thread Form

Motorized worm-gear speed reducers with the high-capacity Delroyd involute helicoid thread form have been designed to facilitate installation and interchange of motors. The inherent high capacity of the thread form and use of centrifugally-cast gears result in maximum load capacity within a compact gear box, higher efficiency and quiet operation.

Motor and worm shafts are connected by couplings which do not require lubrication. And gearing is generated to produce leaving-side contact providing the ideal condition of an entering-side gap for lubricant.

These reducers come in eight sizes for motors from 1 to 20 hp, with center dis-



tances from 2½ to 8 in, and speed ratios of 5:1 to 70:1 and higher. And either single or doubled-extended gear shafts are offered.

De Laval-Holroyd, Inc., 121 First Ave., Trenton 2, N. J.

Meet Denis Plan
the Hercules Technical Man
who Pioneered the Introduction
of Short-Period Delays
in Southern Underground
Coal Mining



It was back in early 1957 when Denis Plan, veteran Hercules technical representative, and several large mining operators conceived the idea of using Short-Period Delays in southern underground coal mines.

Extending over a period of several years, field trials in many underground mines in the southern coal fields proved that the use of Short-Period Delays resulted in:

- Reduced vibration, concussion, and noise*
- Reduced damage to roof, ribs, and pillars*
- Produced more uniform fragmentation and less fines*
- Savings—fewer drill holes needed with reduction of explosives consumption*
- Quicker mining cycle*

Safer operations—less exposure for shot-firer—less smoke and less disruption of ventilation

No Vent® Short-Period Delay Electric Blasting Caps are available in delay periods as recommended by the United States Bureau of Mines for coal mine blasting. Leg wires, with the most modern plastic insulation, are manufactured in a variety of lengths for all mining needs.

For complete information on how No Vent Short-Period Delay Electric Blasting Caps can be applied to your underground mining operation, call your Hercules representative or write direct to the office nearest you.



Explosives Department
HERCULES POWDER COMPANY
INCORPORATED

Hercules Tower
 910 Market Street, Wilmington 99, Delaware

Birmingham, Alabama • Chicago, Illinois • Duluth, Minnesota • Joplin, Missouri • Los Angeles, California • New York, New York
 Pittsburgh, Pennsylvania • Salt Lake City, Utah • San Francisco, California

NEW! CARMET® BR and RB Quick-Change Bits

For Faster Changes... For Longer Life

Faster bit changes and fewer of them are yours with the new Carmet cutter bits designed for tool blocks using a Neoprene cylinder to hold bits without setscrews. Special Carmet advantages make cutting easier, tools last longer.

B style has a flat, square back gage stop to prevent tearing the block and wearing the neoprene, and a front removal notch. RB has a front gage stop and back removal notch for applications where it is easier to remove the bit from the back. The RB's two step tip design leads to easier regrinding, and lower grinding costs.

Detail features of these bits are shown at the right, and both are available with open faced, full radius carbide inserts (designated B and RB), or with the round, cylindrical plug insert (designated BR and RBR).

Why these new Carmet Cutter Bits are Better and Last Longer

- ✓ Gage stops are flat — designed to prevent battering and swedging of tool blocks.
- ✓ Gages are a full $\frac{5}{8}$ inch and have smooth edges to eliminate splitting and mushrooming of blocks. This design also insures longer life for the Neoprene cylinder that holds the cutter bit.
- ✓ Three grades of carbide are available in Carmet cutter bits—to give you long life by matching the right carbide grade to your cutting requirements.

Quality Is In Every Carmet Cutter Bit

Carmet makes its own cemented tungsten carbide inserts. Carmet control over all phases of bit manufacture is your guarantee of top quality.

Call on your local Carmet distributor for mining tools with quality built in all the way through. He has complete stocks of the Carmet tools you need and can help you in their selection because he knows local mining conditions. And, your Carmet distributor is always glad to send out the Carmet field engineer to help you solve tool problems and cut mining costs—or even set up an entire tooling program for your particular mining operation.

Insist on the best in tools and local service. For a catalog supplement sheet on the BR and RB quick change bits, call your local Carmet distributor (see list), or write: Allegheny Ludlum Steel Corporation, Carmet Division, Ferndale, Detroit 20, Michigan. Address Dept. CA-9.

CARMET® 
CEMENTED CARBIDE • DIVISION OF ALLEGHENY LUDLUM

BR-3
Special Cutter
Bit



Front
Removal Notch
Three Carbide
Grades to select from
Maximum clearance
for easier cutting—no
heeling or drag Flat, square gage stop
Notch for Neoprene Cylindrical
wedge

B style cutting bits are the same as
above with an open-faced radius
Carmet Carbide insert.

RB-3 Special Cutter
Bit With Front
Gage Stop



Easier regrinding—
saves grinding costs
New removal notch

Flat Gage Stop prevents wear on
block and Neoprene

RBR-3 style cutting bits are the same
as above with a round cylindrical
Carmet Carbide plug-type insert.

Get more information from your local Carmet distributor:

Supplement to the Carmet Mining
Tool Catalog lists advantages and
quantity prices of the new time-
saving bits. For your copy see your
distributor, or write Carmet.

Birmingham Bolt Co., Ensley, Ala.

Bluefield Hardware, Bluefield, W. Va.

Brace-Mueller-Huntley, Inc.

Offices: Buffalo, Rochester &
Syracuse, N.Y.

Carbon Transfer, Helper, Utah

Carlsbad Supply Co.,

Carlsbad, New Mexico

Consolidated Supply Co., Picher, Okla.

C. F. Gharst Supply Co.,

Terre Haute, Ind.

Gladstein Co., McAllister, Okla.

Goodman Manufacturing Co.

Chicago, Ill.

Marion Mine & Mill Supply Co.,

Nashville, Tenn.

McCombs Supply Co.

Offices: Harlan, Ky. & Jellico, Tenn.

Mine Equipment & Supply Co.,

Madisonville, Ky.

Oglebay Norton Mine Supply Div.

St. Clairsville, Ohio

Peerless Supply Co.

Des Moines, Iowa

Persinger Supply Co.,

Offices: Williamson, W. Va. &

Charleston, W. Va.

W. B. Thompson Co.,

Iron Mountain, Mich.

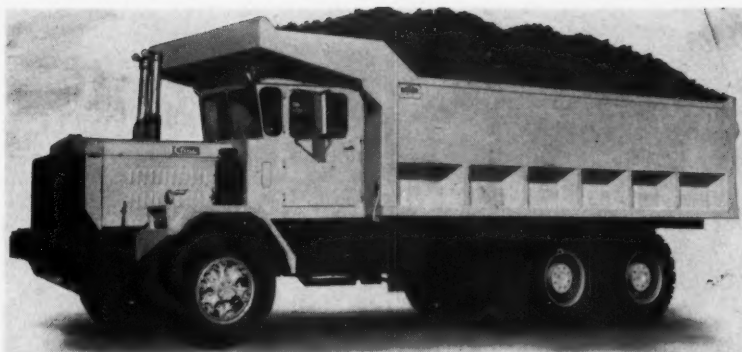
Tri State Mine Supply Co.,

Uniontown, Pa.

Union Supply Co., Denver, Colo.

Vanguard Supply Co., Chicago, Ill.

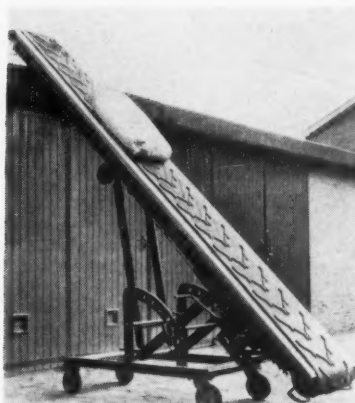
R. A. Young & Sons, Inc., Fort Smith, Ark.



30-Cu Yd Truck

A 30-cu yd truck, the TD-904, has been introduced to the market. It is powered by a 350-hp Cummins V-8 engine through a 15-speed transmission. Front axle is rated at 18,000 lb and the

planetary rear axle at 72,000 lb. All six wheels of the TD-904 use 13x25 tubeless tires. Thompson hydraulic retarder brakes are optional. For additional information, write the manufacturer—Cline Truck Mfg. Co., 3501 Gardner Ave., Kansas City 20, Mo.



Belt Permits 45-Deg Angle Incline Conveyors

Thanks to a new specially-processed cleated conveyor belt produced by a leading rubber manufacturer in the Netherlands, incline conveyors can now operate at steeper angles and transport materials to higher levels without slippage. With the "Chevron" type cleated conveyor belt, it is possible to enlarge an angle of slope ranging between 22 and 28 deg to at least 35 deg. According to the maker, tests on paper bags of fertilizer succeeded in achieving a 45-deg angle of ascent.

Both cleats and belt are vulcanized and homogenized simultaneously to form one piece of rubber in a single curing process. It is not necessary to redesign rollers as the cleats are made of specially-compounded rubber permitting maximum flexibility. Thus the four-prong-designed cleats can move underneath the roller without damage.

Already installed in a number of European coal mines, the belting is now

being introduced to the American market by Voss Belting & Specialty Co., Inc., Chicago, U. S. representative of the Royal Adam Tanning & Belt Mfg. Co. Ltd. of Delft, the Netherlands.

For more data, write Netherlands Trade Commission, 10 Rockefeller Plaza, New York 20, N. Y.



Larger Capacity Tractor Shovel

An improved series "B" version of the Hough H-30 four-wheel-drive "Pay-loader" tractor-shovel now includes a 1¼-cu yd bucket, adding 25% more capacity. This unit, however, retains the same balance and stability of the original H-30.

One safety advantage is that the boom arms are positioned ahead of and away from the operator. In addition, the H-30B has a walk-in operator compartment, new hand rails and safety ladder, adjustable bucket seat and new transmission controls. And the steeply-sloped cowl, with no obstructions to left or right, provides excellent operator visibility. Extra attention was also given to maintenance ease and accessibility.

Frank G. Hough Co., 735 Seventh Ave., Libertyville, Ill.

**GOT A WELDING
PROBLEM?**



on the following pages
READ...

- 1** How McKay Tube-Alloy 240-Wire gives 400% longer life than previously used Hard Surfacing material for Peabody Coal Company's Bucket Teeth.
- 2** Why McKay Hardalloy 120 is the correct Hard Surfacing Electrode for joining dissimilar metals and hard-to-weld steels.



**THE
McKAY
COMPANY**

403 McKAY BLDG. • PITTSBURGH 22, PA.



16,000 ft. of neoprene-covered belting hauls jagged slate and coal to rail points at 250-300 ft./min. Installed in September '58, belt is specially designed for underground service.

LIGHTWEIGHT CONVEYOR BELT THRIVES ON HEAVY-DUTY SERVICE!

Still "like new"—despite nearly three years of brutal underground service! That's the latest report from Royalty Smokeless Coal Co.'s Medo No. 2 Mine, Cliff-top, W. Va., following a recent inspection of the belt shown above. And here's the reason: covers of tough, resilient *neoprene* synthetic rubber, coupled with a unique, lightweight, all-synthetic carcass.

Neoprene's reputation for prolonging belt life is based on its resistance to conditions that pound the life out of ordinary belting. Flexible and fire-resistant, neoprene also defies abrasion and impact, protects belt carcass from oil and grease, moisture and mildew. And

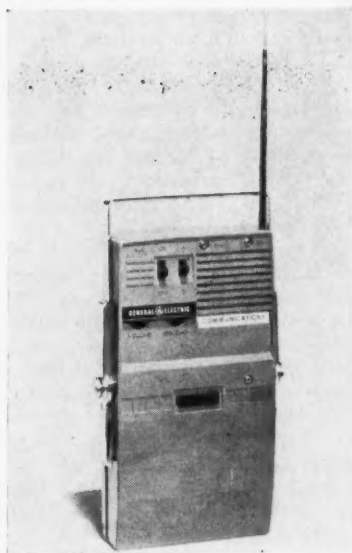
its high coefficient of friction minimizes spillage, slippage and "run out" at loading points—delivers maximum loads over the head pulley.

Next time *you* order belting, make sure it has a cover of rugged, longer lasting Du Pont neoprene. No other material has been so thoroughly proven in severe mining service above ground and below... as cable jacketing, conveyor belting and hose. For more examples to show how neoprene-covered belts are serving industry, write: E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department CA-9, Wilmington 98, Delaware.



NEOPRENE
SYNTHETIC RUBBER

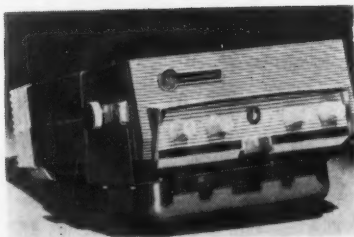
Better Things for Better Living... through Chemistry



Two-Way Radios

General Electric introduces two new two-way radios.

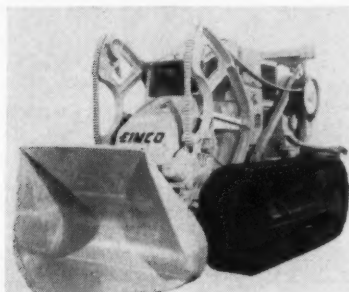
The first is a personal portable type (left) described as the smallest, lightest, most compact VHF-FM man-carried communications unit to be marketed to date with transmitter and receiver in a single case. Called the "Voice Commander," it will be manufactured for high-band frequencies (132-174 mc.)



with one-watt transmitter RF power output and will have a built-in collapsible telescopic antenna. Weighing a little more than 4 lb, this radio stands 9.5 in high and is 5.3 in wide and 1.7 in deep. Earpiece or lapel speaker and tiny external microphone are optional.

The other model (right) is reported to be the first transistorized unit to provide dual-frequency listening through a common receiver. Simultaneous monitoring equipment permits the two-frequency reception at much less cost and current drain than two separate receivers used to accomplish the same purpose. Because it can monitor two frequencies regardless of spacing in low or high band, or can monitor "cross-band," listening to a high- and a low-band channel, this concept should find good application where there is a need to listen to two separate intra-company dispatching systems using different frequencies.

General Electric Communication Products Dept., Section P, P. O. Box 4197, Lynchburg, Va.



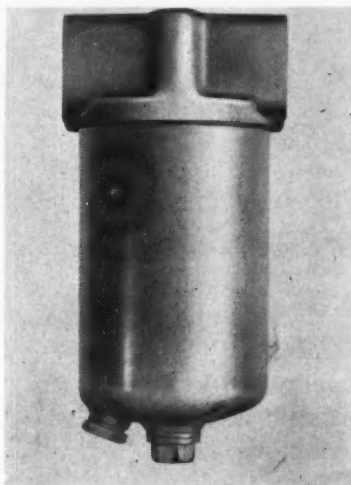
Electric-Powered Excavator

To overcome engine exhaust problems encountered underground, an electric-powered excavator with high-loading capacity uses a totally-enclosed fan-cooled electric motor, fully protected against severe loads and requiring minimum maintenance.

Designated the 105E, this 38,500-lb machine incorporates all the design and productive features of the diesel-powered Eimco 105 excavator. Powered by a 100-hp, 50- or 60-cycle AC electric motor of from 220 or 550 V, the new unit has a speed range to 4.2 mph forward or reverse. It can discharge its 1-cu yd bucket load from as high as 12 ft 5 in.

Maximum drawbar pull with zero track slippage at sea level is 40,000 lb.

Eimco Corp., P. O. Box 300, Salt Lake City 4, Utah.



Two-Stage Micronic Oil Filtration

Designed for two-stage filtration to trap and retain foreign particles over 8

McKAY Tube-Alloy 240-0 WIRE 1



... gives 400% longer life than previously used Hard Surfacing material

"Weld metal deposited by McKay Tube-Alloy 240-0 Semi-Automatic Welding Wire gives 400% longer life than the material we previously used to hard surface our T-1 steel bucket teeth," said Mr. Sanders Payne, Supt. for Peabody Coal Company's Northern Illinois Mine in Braidwood, Illinois.

Before switching to McKay, Peabody Coal got only seven days service from each surface-hardened tooth. Now they get 30 days service from teeth overlaid with McKay Tube-Alloy 240-0 weld metal. Also 12 minutes were required to surface each side of a tooth. Now it takes only three minutes.

Coming out on top in side-by-side comparisons with other materials is a tradition for McKay Welding Wires . . . and Electrodes. No matter what your needs—Mild, Low Hydrogen, Stainless, Hard Surfacing Electrodes and Wires—look to McKay to satisfy your requirements.

WRITE FOR Hard Surfacing Catalog HS-127. Contains information on McKay Hard Surfacing Electrodes and Tube-Alloy Welding Wires, plus list of over 500 applications.



THE
McKAY
COMPANY

403-A McKAY BLDG. • PITTSBURGH 22, PA.

ANOTHER NEW KENNAMETAL* BIT :

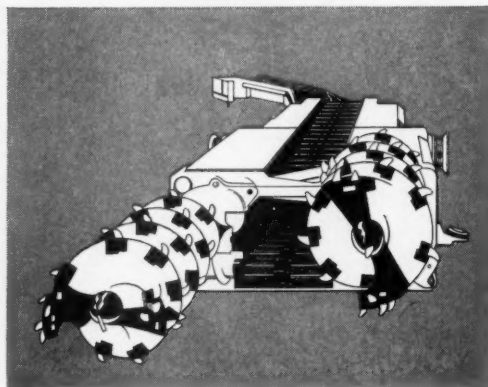


...specially designed for low coal auger-type continuous miners

Here are four advantages you get with the new U23P Kennametal cutter bit:

- 2" gage cuts greater clearance
- produces a higher percentage of coarse coal
- lessens drag on auger scrolls
- provides faster cutting

Prove in your mine how the new Kennametal U23P cutter bit will cut coal faster. Let the quality and design show up in performance—more tons per shift. Call your Kennametal Representative or contact us direct. KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania. Phone: 623-5134.



*Trademark

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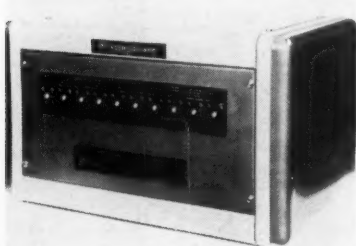
INDUSTRY AND
KENNAMETAL
...Partners in Progress

to 10 microns in size, the OFM Series oil filters have capacities to 300 gpm.

Two layers of Alpha Cellulose are used in the two-stage filtration. The outside layer is untreated and offers a pure absorbent surface which filters out dirt, moisture and acid before the oil passes through the impregnated second layer for fine straining.

These filters provide full-flow filtration at low rates. At high flow rates, the increased pressure differential across the filter causes a poppet valve to open. This by-pass action directs a portion of the oil over the poppet where it rejoins that portion of oil directed through the filter element. The filters are offered in three basic sizes in a variety of porting arrangements.

Vickers Incorporated, Div. of Sperry Rand Corp., Administrative and Engineering Center, Detroit 32, Mich.



Master Station Controls 10 Remote Posts

A simplified supervisory system, called "Unicode," handles the control and indication of a single device at a remote station.

At each remote station Unicode will close and trip one device such as a circuit breaker or motor contactor, while at the master station continuously indicate with a lamp whether the device is open or closed and sound an alarm when the position changes. Up to 10 remote stations can be controlled from a single master unit over one pair of telephone-type line wires.

The system is intended for application where the master station and all remote posts are located within a relatively small area so that the loop resistance of the line-wire channel is low. It is also suitable for systems requiring remote centralized control. Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

"Job-Engineered" Solid-Woven Conveyor Belting

Woven as one heavy, solid unit, this specially-engineered conveyor belting incorporates the strength and bulk of

cotton with the resilience and strength of nylon. Two styles and three grades—PVC, neoprene and rubber-covered—are offered.

By combining heavy-duty cotton and nylon cords completely interwoven lengthwise and crosswise, an extremely coarse weave is formed. This solid-woven construction not only improves fastener-holding strength but also provides exceptional resistance to general abuse. In addition, heat setting and pretensioning give controlled elongation, preventing belt stretch.

For underground mining, the belt carcass is impregnated and coated with polyvinyl chloride resulting in an extremely tough, fire-resistant, reduced-cost belt. Load and belt slippage, common to this type belt, is overcome by placing a special embossed surface on both sides.

Using a variety of rubber compounds for coating, a third basic type is offered for all industrial applications. Having excellent impact and puncture resistance, it is extremely flexible (for 35- and 45-deg deeptrough idlers), has outstanding high-cover adhesion and is able to operate over smaller pulleys (high warp crimp). Hewitt-Robins, Dept. SW, Stamford, Conn.



COMPRESSORS—A new series of air-cooled stationary compressors, designed to deliver from 200 to 600 cfm of air at 250 psi, have applications for high-pressure drilling with down-the-hole tools on mobile equipment. This rating is supplied by 3- and 6-cyl versions of two basic models. Completely self-contained, these compressors operate with a load-unload pressure control system. A six-blade fan, belt driven from the crankshaft, circulates air through the passages of the intercooler to reduce compression temperature between stages. The unit weighs approximately 2,300 lb less flywheel. Le Roi Div., Westinghouse Air Brake Co., Sidney, Ohio.

FLAME CUTTING—A 19-lb, flame-cutting machine makes fast clean cuts in

McKAY Hardalloy 120 HARD SURFACING ELECTRODE

2



is ideal for joining dissimilar metals and hard-to-weld steels

McKay's new Hardalloy 120 Hard Surfacing Electrode is tailor-made for joining such dissimilar metals and hard-to-weld steels as austenitic manganese to carbon steel, austenitic manganese to T-1 steel and stainless steel to carbon steel. The weld deposit is an excellent build-up material because of high compressive strength and ability to withstand repeated impacts with minimum deformation and no cracking.

Hardalloy 120 weld metal has good corrosion resistance and hot hardness up to 1000° F.; bonds well to both carbon steel and 12-14% austenitic manganese steel; work hardens under repeated impact. It is recommended for rail frogs and crossovers, dipper teeth, T-1 steel lips, manganese buckets and many other demanding applications.

WRITE FOR Hardalloy 120 Data Sheet. Contains full details on operational characteristics, physical properties, and weld metal composition. Specific applications are included.




M-9



THE
McKAY
COMPANY

403-B McKAY BLDG. • PITTSBURGH 22, PA.





KEEP JOBS MOVING WITH **THERMOID** BIG T CONVEYOR BELTS... ABOVE OR BELOW GROUND, THERMOCOAL BELTS COST LESS PER TON OF COAL MOVED

Thermocoal plied belting with step-back, Coledge construction, in installation after installation moves coal at a lower cost per ton than any comparable belt.

WHY? • Thermocoal belting is pre-stressed during manufacture to eliminate in-use stretching.

- Plies are thoroughly impregnated with flame-resistant neoprenes and separated with skim coats to provide superior flexibility and greater impact resistance.
- Tough, nylon breaker strips give extra protection against gouging, provide better bonding of carcass and cover.
- Exclusive Coledge construction puts extra rubber at the edges for edge-flexibility and wear resistance.

Flame-resistant Thermocoal meets USBM standards, and is available in 4-5-6 ply cotton or cotton-nylon-duck construction particularly suitable for long spans and tough, abrasive usage. In Victor (natural rubber) and Ebonite (GRS) grade covers.

Call your Thermoid Big T distributor today to help you select the best Thermocoal belt for your coal handling requirements. He also handles other Thermoid belts and industrial hose to handle any job.



EXCLUSIVE "COLEDGE" CONSTRUCTION—Plenty of rubber where it counts —Stepped back plies make edges more flexible. Result!—Thermocoal rides with the punches when it contacts frame members, lasts longer!

PORTER

THERMOID DIVISION
H. K. PORTER COMPANY, INC.
200 WHITEHEAD ROAD, TRENTON 6, NEW JERSEY

HIGH production

CRUSHING

**TO
UNIFORM
FINE SIZES**



BLACK DIAMOND DOUBLE ROLL CRUSHER

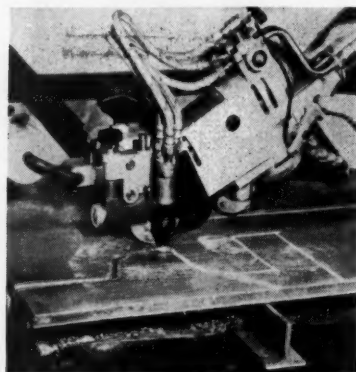
Uniform product size with minimum fines is achieved by a non-fluctuating opening between the rolls during crushing. Low in cost and extremely sturdy, the popular Black Diamond Double Roll is effective in reducing coal, coke, cinders, lime and similar materials. *Features:* Rapid roll-setting adjustment, effective tramp iron protection, wide range of sizes and roll types. Write for Bulletin.

McLANAHAN
Corporation

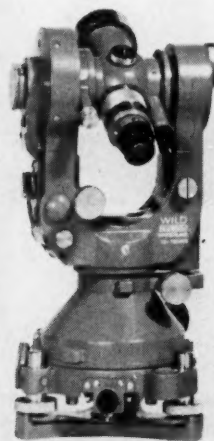
HOLLIDAYSBURG, PENNSYLVANIA

PIT, MINE AND QUARRY EQUIPMENT HEADQUARTERS SINCE 1835

materials ranging in thickness from light-gage sheet to 2-in. The CM-75



"Cadet" is equipped with a clutch which allows instantaneous free-wheeling control, making it suitable for hand-guided continuous cutting. Only one hand is needed to operate the Cadet and simultaneously manipulate all operating controls. The price complete, \$275, includes with the Cadet, torch rigging, four 2 piece nozzles, circle-cutting attachment, six cleaning drills, two balancing weights, two wrenches, heat shield and a 10-ft extension cord. Linde Co., Div. of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.



TELESCOPE ERECTS IMAGES—An erecting-image telescope model of the standard Wild T-2 Universal Theodolite, pictured here, is available in the T-2E. The instrument incorporates the latest design features of this 1-sec instrument for triangulation and precise angular measurements, such as are required in industry and laboratories. Many accessories are also offered with the T-2E which is finished in typical Wild green color, said to be ideal for its low light and high-heat reflecting qualities. Wild Heerbrugg Instruments, Inc., Main & Covert Sts., Port Washington, N. Y.



Here's the quality lube combination that cuts your daily requirements at the face to a minimum. Just *one* of the many job-fitted Sunoco hydraulic oils . . . plus Sunoco 740 A EP Lubricant. Pioneered especially for a two-product program, Sunoco 740 A EP

has the quality you need to do the job right. It pours like oil, clings like grease, provides positive protection during shutdown. It has outstanding load-carrying capacities, resists oxidation and rust, has added film strength to fight ravages of coal and rock dust-

What's so special about these two from Sunoco?



Simply this: they assure you the product *quality* it takes to meet all your daily needs at the face . . . *job-fitted* by men who developed the simplified underground lube program . . . backed by the *service* you have a right to expect. Call your Sun representative today and get squared away on real savings. Or

write to: Sun Oil Company, Philadelphia 3, Pa., Dept. CA-9. In Canada: Sun Oil Company Limited, Toronto and Montreal.

NOTE: Ask your Sunoco or Alemite representative about the Alemite two-pressure pump, especially developed to handle lube applications at the face. Low pressure for fast fills; high pressure for grease fittings. Works perfectly with Sunoco 740 A EP.

PIONEERING PETROLEUM PROGRESS FOR 75 YEARS

Our Editor Reports to



14,342 Bosses

Here at COAL AGE subscriber circulation is a key index of our editorial performance—just as your cost-per ton gauges operating efficiency at your mining property.

For we continue in business only as we successfully edit COAL AGE to serve the job interests and responsibilities of you, the subscriber. We purposely seek your subscription payment—though it pays only a portion of our publishing costs—because we believe it to be tangible evidence of your interest in what our editor and his staff have to say. Thus, by his power of decision, the subscriber is boss—that goes for each of the 14,342 progressive mine officials and supervisors, manufacturers' people and others who currently subscribe to COAL AGE.

To encourage independent evaluation of our circulation against industry-wide standards, COAL AGE became a charter member of the Audit Bureau of Circulations when it was founded as a non-profit, cooperative association 47 years ago next month.

The 2,800 member newspapers, business magazines, farm publications and national magazines displaying the ABC symbol must conform to the high standard set up by the Bureau. Each publisher must open his books to the Bureau's trained auditors, without reservation. The facts as determined by the ABC are published regularly and provide basic criteria for advertisers, who of course bear the bulk of the publishing expense of most publications you read.

In continuing to submit COAL AGE to the supervision and discipline of the ABC over these many years, we have sought to affirm in the strongest possible manner our conviction that our primary obligation is to our subscribers—and that the industry standing we achieve must stem from voluntary demand for our editorial services.

We consider our membership in the ABC a rare privilege. It is our firm purpose to maintain without deviation the high editorial and circulation standards it implies, for the benefit of both our subscribers and advertisers.

A McGraw-Hill Publication
Member of Associated Business Publications



Equipment Shorts

Fire Extinguisher — "Merrimac," an easily-operated cylindrical extinguisher, continues Ansul's original "spare" idea for recharging extinguishers first introduced with the ball-shaped "Monitor" fire extinguisher. If either is used to put out a fire, its empty shell can be unscrewed and replaced as easily as changing a light bulb. Ansul Chemical Co., Marinette, Wis.

Hand Chain Hoists — Spiroid gear transmission for greater power and increased load control is used for the first time in a new line of portable, aluminum hand chain hoists. Spiroid gearings also offer a safety advantage because of greater multiple-tooth engagement. Other features include fewer moving parts and life-lubricated bearings on all rotating shafts. Coffing CB Series Porta-Hoist is available in 11 models with rated capacities from ½ to 12 tons. Coffing Hoist Div., Duff-Norton Co., 4 Gateway Center, Pittsburgh 22, Pa.

Ribbed Conveyor Belt—A practical ribbed conveyor belt handles wet, slippery or soupy materials such as a mixture of gravel and water up inclines. The chevron-shape ribs or cleats prevent the wet material or water from running back even when on an incline because the cleats form pockets that trap the water and hold the materials. If desired, the belt can be reversed to drain the water from the mixture. Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.

Two-Way Radio Circuit—A technological innovation called the "Raser"—Range and Sensitivity Extending Resonator—for the first time gives transistorized two-way radio equipment better sensitivity than tubed receivers. It is reported to improve the distance covered by such radio sets in cars up to 43% and provide clearer, sharper, more distinct messages. Its circuit design uses a triple-section miniaturized cavity filter and a transistorized amplifier in the front end of the completely transistorized receiver to increase selectivity. General Electric Co., Communications Products Dept., Lynchburg, Va.

Alloy Flux—Lincolnweld M-210, an agglomerated alloy flux, has been developed for submerged arc fabricating or rebuilding 12-15% manganese steel parts. Physical properties of weld metal deposits produced with this flux demonstrate a yield strength of 64,400 psi, an ultimate strength of 107,500 psi and an elongation in 2 in of 35%. Lincoln Electric Co., 22801 St. Clair Ave., Cleveland 17, Ohio.

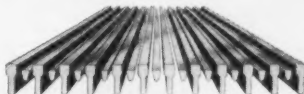
WEDGE-WIRE
REG. U. S. PAT. OFF.

Kleenslot

PREPARATION SCREENS

*designed for vibrators or stationary applications
—for dewatering, screening, washing,
extracting, filtering or sizing*

T-WEDGE KLEENSLOT



A new concept in guard bar design. T-shaped wire replaces typical "bar" to increase screening surface while keeping large unscreenable lumps of material above the tolerance governing lower screening surface.

"S" KLEENSLOT

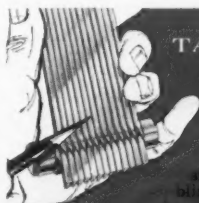


For applications where screening out of flats or slivers is of prime consideration. Also furnished in a "C" bend. Recommended for applications requiring openings larger than 1 m.m.

SCREEN GUARD



Vertical guard bars keep larger unscreenable materials above the actual screening surface. This increases screen life and promotes much greater efficiency in dewatering.

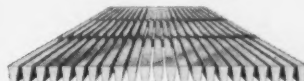


TAPER-SLOT

From loop to loop, the screen opening gradually increases. This design is to eliminate blinding when screening large amounts of near-or-ming size materials. For example, .016 opening tapered to .324—the combination of opening sizes would be the same between each loop throughout the entire screen.

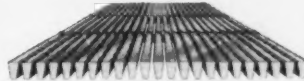
mining oil abrasives foods
chemicals cement phosphates
SCREENING FOR INDUSTRY

F217 and F250 KLEENSLOT



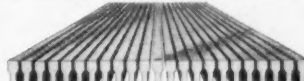
Large size wires maintain maximum efficiency over an extended period in abrasive applications. Although large in wire size, this screen will maintain openings as close as 1 m.m.

MARCEL



This screen, while screening out "slivers," presents a flat surface for materials to wipe the opening clean. Available with openings up to 1 m.m.—for larger opening see "S" screens.

G187 and GB187 HIGH-TEE KLEENSLOT



Special profile increases wearing surface. This is a heavy duty precision type screen that will easily maintain openings smaller than ¼ m.m. and openings larger than ordinarily considered economical.

Wedge-Wire Kleenslot Screens are custom manufactured to your application and are available in many sizes, metals and finishes. Our engineering staff will assist you capably and promptly in obtaining the proper screen for highest production at lowest cost.

**WEDGE-WIRE
CORPORATION**
Wellington, Ohio

send for our free catalog



This Bond Is an Investment in You

Guarantee Bond
ON USED EQUIPMENT

Know All Men by these Presents,

That _____ (hereinafter called Seller),
is held and firmly bound unto _____ (hereinafter called Buyer)
of _____
in the sum of not exceeding the lower of TEN THOUSAND DOLLARS (\$10,000.00),
or Seller's price for the below described used equipment, for the payment of which
Seller hereby binds itself, its successors and assigns jointly by these presents.

**The Condition of this Obligation is such that Whereas Seller has sold to Buyer the below-
described used equipment originally manufactured by Caterpillar Tractor Co. or any of
its subsidiaries:**

Description _____
Model No. _____
Serial No. _____

together with certain attachments affixed thereto, and
Whereas Seller guarantees said equipment and attachments against unsatisfactory performance
due to defective parts for _____ days* after the date of sale shown
below (herein referred to as the guarantee period), the obligation under this guarantee being
only to replace any parts which prove defective under conditions of normal use during
the guarantee period at Seller's expense (including cost of all necessary materials and labor)
up to a maximum of the lower of Ten Thousand Dollars (\$10,000.00), or Seller's price
for said equipment, except that the cost, if any, of transporting said used equipment and/
or attachments from and to the Seller's place of business shall be paid by the Buyer.

**Now, Therefore, if Seller, its successors and assigns shall in all respects well and truly perform
the obligation under the guarantee recited above, then this obligation shall be void; other-
wise to remain in full force and effect.**

THE ABOVE GUARANTEE IS VOID, AND SELLER SHALL BE UNDER NO OBLIGATION
THEREUNDER, IF CLAIM IS NOT MADE TO THE SELLER WITHIN THREE (3) DAYS
AFTER DISCOVERY OF THE DEFECT UPON WHICH THE CLAIM IS BASED.
No guarantee is made or intended to be made by Seller other than that above set forth.

1961

Signed by your Caterpillar Dealer, this bond gives you up to \$10,000 worth of machine dependability



Bonded Buy means guaranteed machine dependability. You can get a completely-checked, used Cat-built machine that has the Cat Dealer's confidence and guarantee, PLUS this bond from Lumbermens Mutual Casualty Company that backs up your machine with as much as \$10,000 worth of parts and labor for the period you and the dealer agree upon.

See your dealer. Read the bond. Check the details. This guarantee can apply on your next used machine. And you pay no extra premium for this assurance. Dependable Bonded-Buy machines are priced right—and your Cat Dealer offers terms to match your needs. Call him or see him soon. Do business with the man whose business is built on dependability.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Setting Tube-Fitting Ferrules—A new device for presetting ferrules of "bite" type Ferulok tube fittings is now offered. The Ferulok consists of body, nut, and ferrule which "bites" the nonflared tube. Designated "Hy-fer-set," the tool eases the task of setting ferrules on steel, stainless steel or Monel tubing because it is operated hydraulically by a hand pump. Parker Fittings & Hose Div., Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio.

Traction Motor Bearings—By combining lower friction of rolling and sliding surfaces with a new tapered flange design and improved "high-arc" cage construction, the "Hi-Miler" bearing achieves a new low in operating temperatures as less heat means more effective lubrication and long bearing life. SKF Industries, Inc., Front St. & Erie Ave., Philadelphia 32, Pa.

Free Bulletins

Screen Tensioners—"Wedgtite" tensioners for cloth and plate-deck A-C screens, described in Bulletin 26B9995, are designed to provide full takeup without changing bolt length. Allis-Chalmers Mfg. Co., 986 S. 70th St., Milwaukee 1, Wis.

Cutting Hardware and Castings—A 4-p brochure covers physical and mechanical properties of ESCO castings made to USS T-1 steel composition. For data on the company's cutting edges, end bits and router bits, ask for Catalog 212-A. ESCO Corp., 2141 N. W. 25th Ave., Portland 10, Ore.

Tractor-Shovel—A specification bulletin is available explaining features of the of the new Model 254 Trojan tractor shovel. Yale & Towne Mfg. Co., Trojan Div., Batavia, N. Y.

Wheels—Mine wheels with pneumatic tires in sizes ranging from 4.80/4.00-8 up to 9.00-10 are illustrated in Catalog CW-61. Saginaw Products Corp., 68 Williamson St., Saginaw, Mich.

Electric Set—Highlighted in Brochure BU-752 are features of the 20-35 kw "Sure-Power" electric set. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Dump Trailers—All important characteristics of "Hy-Tec" and "Hy-Spill" dump trailers and truck equipment are set forth in Bulletin 183. Heil Co., TEC Div., 1285 W. 70th St., Cleveland 2, Ohio.

Surveying—Educational, business, technical and industrial organizations concerned with surveying activities will



It's low cost... it sets up quickly... it fits anywhere...

it's an H-R Wire Rope Conveyor!

Picture your roughest mine bottom. Imagine your lowest seam. Chances are an H-R wire rope conveyor can be installed in it at *less cost and in 1/3 the time of a rigid side frame conveyor.*

The installation above is in the Island Creek Coal Company's No. 28 mine at Holden, West Virginia. The new H-R Style L idlers* give it a 12% increase in capacity. The shock absorbing ability of the wire rope with H-R idlers reduces spillage and increases belt and idler life. When installed in seams as low as 30 inches, there are still 23 inches of useful clearance left over the center of the belt. More than three miles in total length, with flights as long as 4,000 feet, the wire rope conveyor installed at Island

Creek in 1959 is proving the quality of H-R design and manufacture.

Only Hewitt-Robins makes all major rubber and machinery components of a belt conveyor; therefore, single-source responsibility is your best assurance of quality and performance.

Care to see one in operation? Just contact your H-R field engineer. Want more information? Write for new H-R bulletin below. Hewitt-Robins, Stamford, Connecticut.

* Pat. Pend.

*Write today for complete facts,
installation data.
Bulletin 9-49*



HEWITT-ROBINS

Conveyor Machinery and Belting • Power Transmission
Hoses • Vibrating Equipment • Engineering Services

SIZE CONSIST

judged most important coal property for combustion performance

COAL PROPERTIES SIGNIFICANCE CHART FOR COMBUSTION PERFORMANCE

	S.R.	M.R.	STOKERS		P.F.	Cyclone
			T.G.	S.S.		
1. Size consist (as fired)	V	I	I	V	V ¹	V
2. Moisture ²	M	M	N	M	V	M
3. Caking Index ³	I	I	V	M	N	N
4. Ash Fusibility	I	I	M	M	I	V
5. Grindability	N	N	N	N	V	N
6. Friability	M	M	M	M	N	N
7. Volatile Matter	M	M	M	M	I	M
8. Fixed Carbon	N	N	N	N	M	N
9. Ash Content	M	M	M	M	M	M
10. Calorific Value	N	N	N	N	N	N
11. Ash Viscosity	M	M	M	M	I	V
12. Ash Composition						

—See Footnote 4—

FOOTNOTES:

¹ Degree of fineness is a better term for P.F.

² Surface moisture is more critical than inherent moisture. Moisture is very important from the standpoint of plant flowability.

³ Some engineers are attempting to use the F.S.I. as an index of the degree of caking.

⁴ Ash composition is very important as it affects fireside fowling, but not important to combustion.

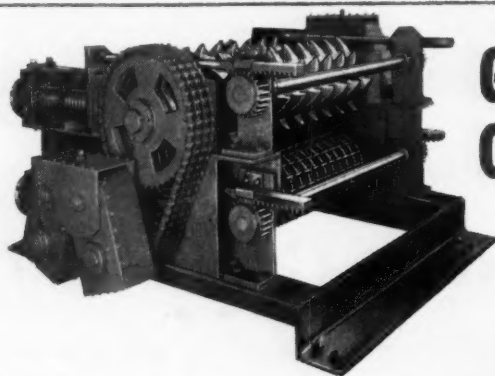
RATING CODE:

V — Very important

I — Important

M — Minor importance

N — Little or no importance



GUNDLACH CRUSHERS

provide
greatest
uniformity of
SIZE CONSIST

Coal Utilization, in a survey, asked power plant operators to rate thirteen properties of coal as being very important, important, of minor importance, or of little importance. The plants participating were fired by single or multiple retort underfeeds, travelling or chain grates, spreaders, pulverized fines or cyclones.

Without exception the operators of every type of firing device rated size consist as very important or important. No other coal property even approached size consist in importance in their opinion.

Let a Gundlach Crusher prove to you through a crushing and screening test at your mine that it provides the greatest uniformity of size consist. Your customer benefits by control of top size... less fines... less unburnt coal in ashes... more BTU output per ton... lower ash handling costs... greater overall utilization.



T. J. GUNDLACH MACHINE CO.

P. O. BOX 283 • BELLEVILLE, ILL.

Division of J. M. J. Industries

be interested in a 35-min, 16-mm sound film in color based on the theme that all development has surveying as a foundation. It is entitled "Paving the Way to Progress." Wild Heerbrugg Instruments, Inc., Main & Covert Sts., Port Washington, N. Y.

Screens and Conveyors—Bulletin B-100 describes a line of horizontal vibratory screens and conveyors just released. COMCO Corp., 5421 Lancaster Ave., Philadelphia 31, Pa.

Truck Maintenance—Mounting costs of truck fleet operations (small and medium-sized fleets) are the target of a comprehensive new Trouble-Free Maintenance Plan. Major elements of the plan include a TFM Guide covering systematic preventive maintenance and telling how to establish a maintenance program, lubrication charts and a set of maintenance record forms. Gulf Oil Corp., Dept. DM., Gulf Bldg., Houston 2, Tex.

Drive Selection—A simplified method for selecting "Flexidyne" dry-fluid drives and couplings for most industrial applications is featured in new, 20-p Bulletin 70. Dodge Mfg. Corp., Mishawaka, Ind.

First-Aid Outfit—Specially designed for training and contest work, a complete 58-piece first aid outfit is described and illustrated in Bulletin 0408-23. Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.

Preparation Equipment and Crushers—Two pieces of literature covering Lippmann products includes Bulletin 1910 describing the company's complete line of equipment and Bulletin 1170, specifically devoted to the firm's single- and double-rotor Impact Crushers. Lippmann Engineering Works, Inc., 4603 W. Mitchell St., Milwaukee 14, Wis.

Steels—Two brochures are offered covering J&L high-strength, low-alloy steels. One describes Cor-Ten and the other, the J LX-W series, which are produced to four strength levels up to 60,000 psi minimum yield point. Jones & Laughlin Steel Corp., Pub. Rel. & Adv. Dept., 3 Gateway Center, Pittsburgh 30, Pa.

Respiratory and Paging Equipment—Bulletin 1007-10 covers interchangeable respiratory protection provided by the M-S-A Dustfoe and Gasfoe, showing how one facepiece can be used with a variety of filters and chemical cartridges. A combination telephone and loud speaker is explained in Bulletin 1600-1. Self contained, the transistorized Pager uses existing interplant or mine telephone lines. Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.

**WORLD'S LARGEST
COAL LOADER
LIFTS**

**SEVENTEEN TONS
WITH
MUSCLES OF**

**YELLOW
STRAND**



**Truax Traer Coal Company depends on Yellow Strand
for extra strength and durability at Burning Star Mine #2**

Truax Traer's "Little Dipper" at its DuQuoin, Illinois, mine handles more coal per bucket (14 cubic yards) than any other two-crawler loader fills a large Euclid wagon in 4 loads. Takes a lot of rope strength to handle such a load. Takes a lot of rope durability

to keep such a loader working, too. No wonder the wire rope choice was Yellow Strand - famous for its ability to cut downtime. Whatever your rope needs, depend on Yellow Strand to hold down costs. Depend on your Yellow Strand distributor for satisfaction.

Yellow Strand
WIRE ROPE

BRODERICK & BASCOM ROPE CO.
ST. LOUIS • PEORIA • HOUSTON • SEATTLE

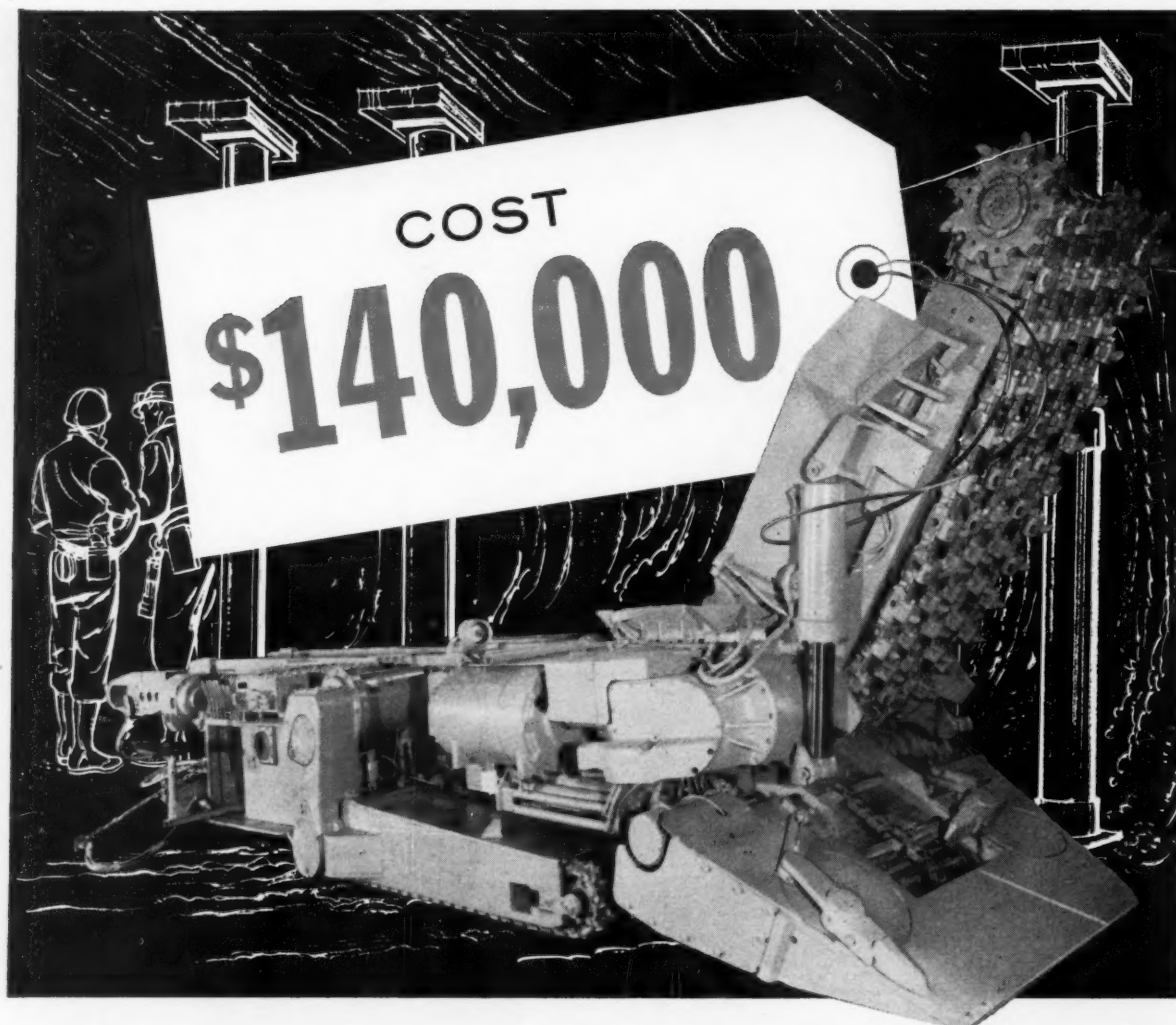


Photo courtesy Joy Mfg. Co.

Protect this \$140,000 investment with a Texaco "Stop Loss" Program

In 2 out of 3 mines, faulty lubrication practices are imposing a triple penalty on mine management. First, they take an unhealthy bite out of large capital investments in equipment by drastically shortening its potential life. Second, they skyrocket maintenance costs by multiplying the times the machine has to go to the shop. Finally—and most important—improper lubrication cuts tons-per-man rates by lowering equipment availability.

A Texaco "Stop Loss" Program can minimize these losses. Texaco's new program of organized lubrication can help save you money in practically every mine operation. It will certainly extend equipment life, raise your tons-per-man rate—and help you slash maintenance costs by at least 10 per cent.

How Texaco's Program works. Texaco's "Stop Loss" Program is primarily concerned with getting the right

lubricants into the right place at the right time. It involves an analysis of your requirements, the selection of the proper lubricants, and the training of your personnel in their application. *And it produces results.*

Ask your local Texaco Representative to prove what a "Stop Loss" Program can do for you. Contact the nearest of the more than 2,300 plants distributing Texaco Products or write to:

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

Tune In: Huntley-Brinkley Report,
Monday through Friday—NBC-TV

TEXACO



Throughout the United States

Canada • Latin America • West Africa

Among the Manufacturers

Two personnel promotions have been announced by **The Daniels Co.**, Bluefield, W. Va. **Charles A. Peters** moved up to vice president and general manager while **Edward H. Taylor** was made general superintendent of manufacturing and installations.

Schaeffer E. Specht, in his new capacity as general sales manager, will supervise all sales operations for **Buell Engineering Co.**, New York, N. Y., and its Northern Blower Div. in Cleveland, Ohio. Formerly Western District sales manager, he has been active in the air pollution and dust recovery field for the past 10 yr.

Sun Oil Co. named **Maynard D. Upper** industrial products manager of its Middle Atlantic sales region with headquarters in Philadelphia. Previously industrial products manager at Cleveland for four midwest sales districts since October, 1959, Mr. Upper served in various capacities at different locations since he joined the firm in 1949. He succeeds **Robert C. Brady**, named sales coordinator for Sun Olin Chemical Co., Philadelphia.

Robert Prox Sr., president, **Frank Prox Co.**, has announced his retirement after 46 yr with the company. He will, however, remain a member of the board of directors and continue with his interests in both the mining and heating industries. He will be succeeded by his son, **Robert Prox Jr.**, who had been vice president.

Two major promotions on the engineering staff of **Marion Power Shovel Co.** have been announced. **Jack F. Weis** is now chief engineer of the intermediate and large machine division while **Marion F. Cole** has been named chief engineer of Marion's small machine division.

Company Briefs

Bucyrus-Erie Co. on July 1 formed a new Midwestern Sales Region with headquarters in St. Louis, Mo. **George D. Grayer**, formerly drill sales manager, has been chosen sales manager of the new territory covering Kentucky, southern Indiana, southern Illinois, Missouri, Iowa, Kansas and Nebraska (except the western panhandle area). The company's new Midwestern Regional sales offices are located at 7751 Carondelet Ave., Clayton 5, Mo. **Selden A. Stone** succeeds Mr. Grayer.

In addition, the revamped Central Region, with sales offices in Chicago and a sub-office in Pittsburgh, Pa., now includes western Pennsylvania, West Virginia (both formerly in the Eastern Region) and Ohio, Michigan, Northern Indiana, northern Illinois, Wisconsin, Minnesota and North and South Dakota. **Henry J. Vines** continues as sales manager of the Central Region.

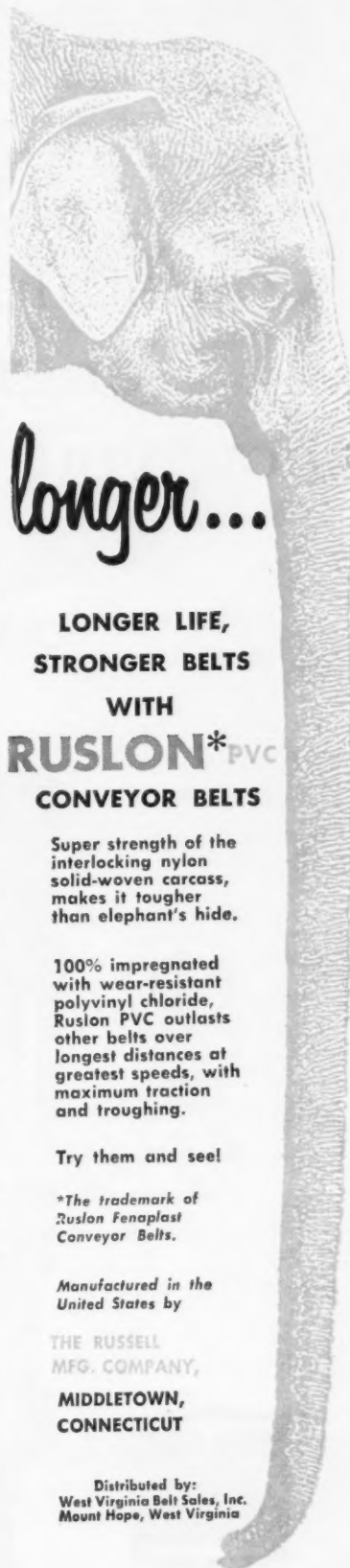
B-I-F Industries, a leader in automatic flow control, measurement, etc. and systems engineering, has consolidated with **New York Air Brake Co.** as a division of that company. Continuing in Providence, R. I., B-I-F will retain the same operating management with no change in aims or objectives.

This consolidation is announced as a major step in the growth of B-I-F and consistent with the continuing program of diversification and expansion of New York Air Brake Co.

Nitro-carbo-nitrate, a widely-used, low-cost component in blasting materials, will be manufactured in a plant now being constructed by **Spencer Chemical Co.** in Carlsbad, N. M. Representing an expansion of the company's activities in the mining industry, the new plant will perform the operation of mixing ammonium nitrate with carbonaceous materials, normally done at or near the blasting site and will package the mixture in 50-lb bags.

All basic and applied research, product development and engineering of **Mine Safety Appliances Co.** will be centralized in a newly-established corporate Research and Engineering Div. In addition, personnel and facilities of **MSA Research Corp.**, a subsidiary, will be integrated into the new division. **Roger F. Mather**, formerly with U. S. Steel Corp., has been named director of the division and **Dr. W. P. Yant**, in charge of MSA's research activities for the past 25 yr, will become research consultant to the president. Three associate directors appointed are **J. W. Mausteller**, research; **R. C. Werner**, engineering and development; and **J. P. Strange**, product engineering. And **D. N. Wise** has been made manager of administrative services.

A new plant at Lynchburg, Va., for the production of distribution transformers, lightning arresters and industrial crane conductor systems, has been placed in operation by **Delta-Star Electric Div.**, **H. K. Porter Co., Inc.** This plant will serve electric utilities and industrial customers under the management of **R. W. Dixon**, formerly manager of the company's Electric Service Works.



longer...

**LONGER LIFE,
STRONGER BELTS
WITH
RUSLON* PVC
CONVEYOR BELTS**

Super strength of the interlocking nylon solid-woven carcass, makes it tougher than elephant's hide.

100% impregnated with wear-resistant polyvinyl chloride, Ruslon PVC outlasts other belts over longest distances at greatest speeds, with maximum traction and troughing.

Try them and see!

*The trademark of Ruslon Fenoplast Conveyor Belts.

Manufactured in the United States by

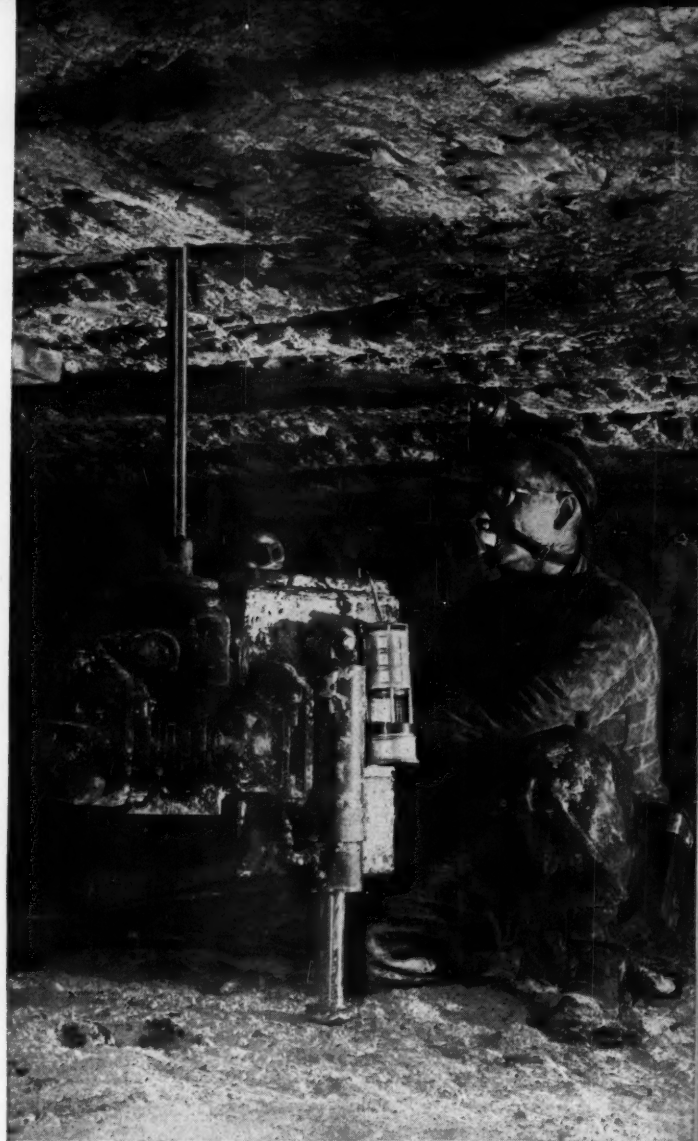
THE RUSSELL
MFG. COMPANY,
MIDDLETOWN,
CONNECTICUT

Distributed by:
West Virginia Belt Sales, Inc.
Mount Hope, West Virginia

Let a
Bethlehem
engineer
show you what
roof bolts
can do



for Strength
... Economy
... Versatility



This Bethlehem roof bolt engineer is drilling to make a test installation in a coal mine. Besides increasing protection against rock fall, Bethlehem roof bolts will also assure maximum headroom and haulageway clearances.

Bethlehem roof bolts minimize the danger of roof falls because they grip the strata, with the great strength of steel, to keep roof and walls in place.

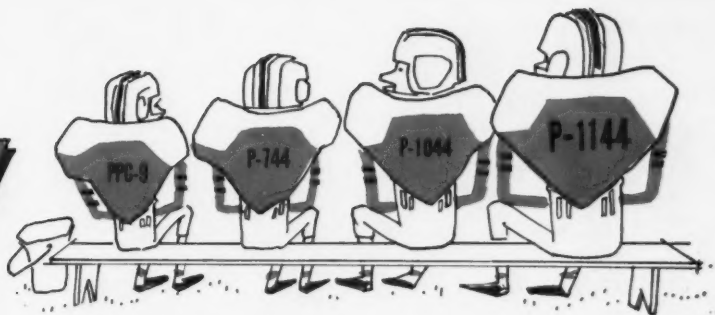
A Bethlehem engineer will consult with you, without obligation. He will make tests in the strata to determine whether the rock lends itself to bolting. And he'll help to get your bolting crews started properly.

For the full story, get in touch with the nearest Bethlehem sales office. Or write to us at Bethlehem, Pa.

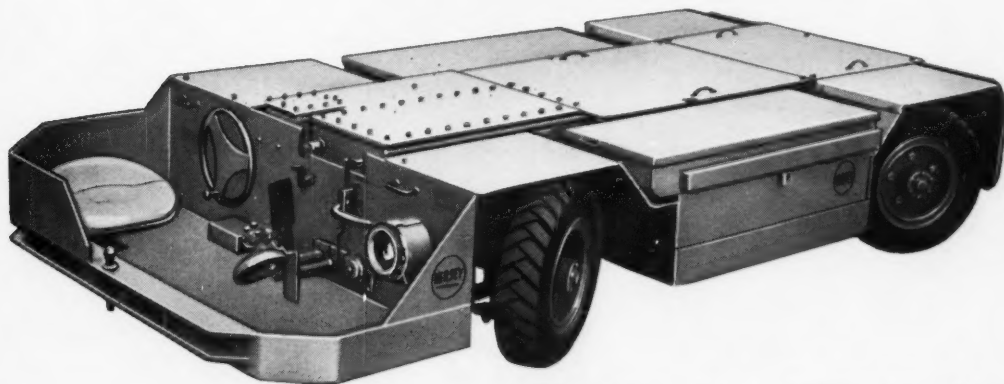
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

KERSEY

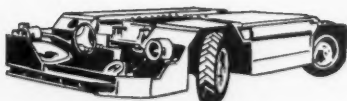


All-Star Permissible Mine Tractors for every need!



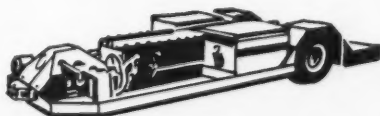
Newest and Largest on the team

Kersey P-1144 Permissible Mine Tractor weighs approximately 13,000 lbs. All four wheels drive and carry an equal load, regardless of uneven ground, due to unique wheel suspension. Ideal for moving power centers, belt heads, and for rock dusting.

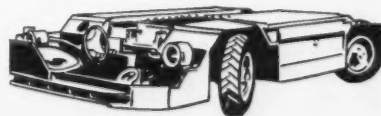


Kersey P-744, 4-wheel drive, steer and brakes, weighing 9,500 lbs. for smaller duty jobs in restricted mine travelways.

Optional equipment includes (a) Permissible Power Take-Off for operating Rock Dusters or other equipment. (b) Dozer Blade for cleaning up and maintaining roadways. (c) Winch, 10,000 lb. capacity, with three speeds. (d) Front Cargo Deck for light supplies and personnel.



Kersey PPC-9 Permissible, Personnel, Supply and Service Tractor. Used as mechanics car, supply truck or emergency vehicle. Rear cargo deck will accommodate stretcher, has 2,000 lb. capacity.



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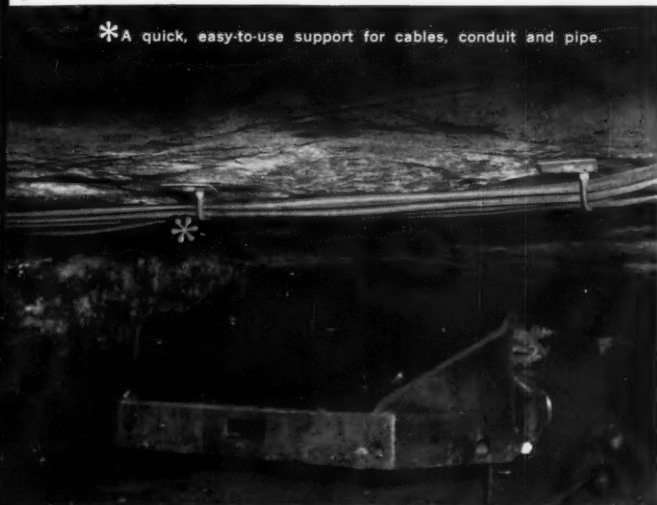


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2—16" x 15' screw feeders
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1—Double roll, 48" wide x 36" dia. rolls,
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4—150 tons capacity, 2-compartment, O.D.
16' x 20' x 27' high
1—375 tons capacity, cylindrical, cement
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2—100 tons Aggregate bins with batch
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1—375 tons capacity, 5-compartment
2—50 & 100 tons capacity, with batch
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3 deck
1—Tyler "Ty-Rock" Model F-600, 4'x14',
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1—Tyler "Hummer" 4'x8', single deck,
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- 1—35L Jeffrey Cutting Machine
- 1—12G-3 Goodman Cutting Machine
- 3—7B Sullivan Cutting Machine
- 2—4JCM Joy Continuous Miners, 440 Volts AC.
- 1—T2-SAPE Joy Machine Truck
- 1—112G-3 Goodman Cutting Machine.

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- 3—7BU Joy Loaders
- 1—18R Joy Loader
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- 2—60E-10 Joy Shuttle Cars, modern.
- 2—65C-7E Joy Shuttle Cars, modern.
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- 2—42E-18 Joy Shuttle Cars, completely modern.
- 1—32E-7 Joy Shuttle Car.
- 2—10SC-1F Joy Shuttle Cars, 500 Volt DC.
- 3—Model 48 TorKar Shuttle Cars.

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- 3—512 EJM & EJ Goodman Cutting Machines.
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- 2—28LC Jeffrey Top Cutters.
- 3—35B Jeffrey Cutters.
- 6—35BB Jeffrey Cutters.
- 5—35L Jeffrey Cutters.
- 1—7AU Sullivan Cutter.

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- 1—300 KW General Electric Portable Rectifier
- 1—400 KW American Selenium Rectifier

MOTOR GENERATORS—250 & 275 Volts DC

- 1—300 KW, G.E. MG Set, primary 2300/4160, 1200 RPM
- 1—G.E. 200 KW MG Set, primary 2300/4160, 1200 RPM
- 1—200 KW Westinghouse MG Set, primary 2300/4160, 1200 RPM
- 1—150 KW Westinghouse MG Set, primary 2300/4160, 1200 RPM
- 1—150 KW G.E. MG Set, primary 2300/4160, 1200 RPM
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- 3—50 KW G.E. MG Sets, primary 2300/4160, 1200 RPM

DIESEL PLANTS

- 1—150KW Diesel Gen. Set, 250 Volt DC with twin 671 GM Engine.
- 1—75KW Diesel Gen. Set, 250 V. DC with 671 GM Engine.
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- 1—100 KW Superior Diesel Gen. Set, 275 V. DC
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ROTARY CONVERTERS, 275 Volts DC,

Primary 2300/4000

- 1—300 KW Westinghouse, Pedestal Type
- 1—100 KW G.E. HCC-6, 1200 RPM, Pedestal Type
- 1—200 KW G.E. HCC-6, 1200 RPM, Pedestal Type

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- 1—36" Barber Greene Lattice Frame Conveyor, 150' long.
- 1—MTB-30 Joy Conveyor Line Complete, 1500 ft. long, equipped with tandem drive 25 or 40 HP, AC or DC Motor.
- 1000"—26"—97C Goodman Belt Conveyor, complete.
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- 1—350' LaDel Conveyor Line, complete
- 1—300' Joy Pans & Chains, complete.
- 5—61AM Jeffrey Conveyors—300' long.
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- 1—Jeffrey 300—15" Chain Conveyor.

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- 1—G.E. 6 Ton Locomotive w/Reel, 36" gauge.
- 1—1030 Goodman Locomotive, 24" high, 44" gauge.
- 1—13 Ton Goodman—Type 81A04T, Modern.
- 1—Goodman 13 Ton 136B-0-4-B w/75 HP Motors.
- 2—13 Ton Jeffrey Locomotives
- 1—Goodman 5 Ton 3012 with 50 HP Motor.
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- 1—8 ton LM2-8-T.DD G.E. with 2—50 HP Motors.
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- 3—Greensburg Monitors complete charging equipment.

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- 5—PL11-16RPE Joy Elevators.

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- 1—Robins 36"x36" Double Roll Stoker Crusher.
- 1—Pa. Single Roll Crusher—24"x40"
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- 1—American Pulverizer 24"x24", 30 tph—#WC-24
- 1—American Pulverizer 24"x30", 75 tph—#WC-30
- 1—American Pulverizer 36"x30", 100 tph—#AC-30-S.

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- 19—Sanford Day 3 Door Drop Bottom Cars, 36" high.
- 24—AC&F 3 Door Drop Bottom Cars, 34" overall height without 10' sideboards.
- 173—AC&F Drop Bottom Cars, 48" high, new condition.
- 5—Mantrip Cars.

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- 1—Coppus Ventair Blower.
- 5—8x16 Allis Chalmers Pumps with motors.
- 1—16x14 Allis Chalmers Centrifugal Pump, complete.
- 1—Roberts & Schaefer Electric Vibrator.
- 1—Roberts & Schaefer Air Drying Plant, complete.

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- 1—Shovel Dipper Stock for same, 16' long, 3/4 yard dipper.
- 1—1950 International Flat Bed Tandem Truck.
- 1—Allis Chalmers Tractor Hi-Left.
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- 2—T2-SAPE Joy Machine Trucks.

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- 25—CP-472 Electric Coal Drills, 250 Volts DC.
- 5—CP-572 Coal Drills, 250 Volts DC.
- 10—Chicago Pneumatic Little Giant Coal Drills, 220 Volts AC.
- 2—CD-22 Joy Coal Drills, 250 Volts DC.
- 5—Dooley Self-Propelled Drill Trucks, twin-armed, track or rubber.

ROOF BOLTING MACHINES

- 1—RBD-30 Chicago Pneumatic Roof Drill.

HOISTS

- 10—Vulcan-Denver #11 1/2 Material Hoists w/motors.
- 1—Brownie Hoists, 5 HP, AC
- 1—Brownie Hoist, HKO, good condition.

COMPRESSORS

- 2—Acme Self-Propelled Air Compressors, Model 168.

ROCK DUSTERS

- 2—Manson 24-S Wet Rock Dusters.
- 2—MSA Rock Dusters, 25 H.P. Track
- 2—MSA Bantam Rock Dusters, rubber tired.
- 1—American Mine Door Rock Duster, 22" high.

FANS

- 1—Jeffrey 8H-42 Aerodyne Fan complete w/motor, "V" belt & tubing.
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- 3—2300/4160 Y—230-115 Volt—200 KVA G. E. Transformers.
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300 Tons 2'-6"

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1—2" Aurora, 50 GPM/100'

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1—5' x 6' including vibrating double deck

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2—5' x 10' type B, centrifugal vibrating

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500-Tons 40# rail

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Excellent mechanical and electrical condition.

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1500 P&H 6 yd. Elec. Shovels
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 - 6-700 & 900 Dooley track & post mounted
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 - 4-112AA & 112A Goodman A/C & D/C
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- 4—Westinghouse Type 4-YC, 7½ HP with controls.
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- 4000—Beltting 4-5 and 6 ply 20", 24", 30" and 36"
- 20—Head Pulleys for above Belts 24" and 30" Dia.
- 20—Tail Pulleys for above Belts 20" and 24" Dia.
- 20—U.S. Syarco and Link Belt Drives 3.5, 10, and 20 HP.
- 2—"Transpometers", for 24" & 30" Belts. 80 & 120 TPH at 200 FPM.
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- 3—Amco 36" Scraper.
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- 2—Rolls—Bethlehem 1½" Dia., 6 x 12, 4200' each roll.
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- 1—Roll—G.E., 3 Conductor, lead covered, 500'.

CARS—MINE

- 15—Granby—94 Cu. Ft., side dump (Unused).
- 15—Grandy—75 Cu. Ft., side dump.

CLASSIFIERS

- 3—Dorr Duplex 4' x 25', Type DSFH.

CRANES

- 1—Euclid 20 Ton Cap. 30' Span, 45' Lift, 3-Motor, AC Voltage, Modern.
- 1—Link Belt Crawler, 1½ Yd., Clam Bucket, Ser. 1837.

CRUSHERS

- 1—Tel-smith Model 10-B, 1¼" openings, Cap. 38 to 44 TPH, 30 HP, Ser. 1504.

- 1—Birdsboro Buchanan, Type C, Jaw, Size 30" x 42", 100 HP, Ser. 1092.
- 1—AJO—Tayler 60" Dia. x 18", 2—100 HP with Controls.
- 1—Penn. 24" x 24", Single Roll.
- 1—Symons, 4' Short Head Cone crusher, Course Bowl, 125 HP Motor.

DRILLS—DRIFTER—STOPEHAMMER—GRINDERS

- 2—IR, DA-35, on 9' shells.
- 14—IR, DA-35 on 4' shells.
- 6—IR, JA-55 Jack Hammers.
- 6—IR, JR-38 Jack Hammers.
- 23—IR, P-48 Stopehammers.
- 1—IR, Size JA-3, Air Grinder for Bits.

DUST COLLECTOR

- 1—AAF "Roto-Cone" No. 36, Type W, 30,000 CFM, 75 HP with Controls.

HOISTS

- 1—Nordberg—Double Drum, 6' Dia. x 66" Face, 1000 RPM of 16,000 lbs. line pull drum, Cap. 4-450 1½" cable, 500 HP 3-60-2300 Volts. All controls.
- 1—Belmont Double Drum, 300 HP-3-60-2300 Volts. All controls.
- 1—Lidgerwood, single drum, 8' Dia. x 4' Face, G.E. 150 HP.
- 1—Link Belt Stope Hoist, Side D-20, 48" x 48" Drum, 700' 1" Cable.

HYDRO—SEPARATORS

- 2—Dorr, Type A, 8' x 4' Deep, 1½ HP, S/N 7861, 7860.

HOISTS & SLUSHERS—AIR

- 6—IR, Model EUA, 1000 lbs. cap.
- 1—Joy Double Drum, Model EP113-33, 50 HP.
- 3—Joy Double Drum, Model EP 113-38, 30 HP.
- 2—Joy Double Drum, Model EP 110-115, 15 HP.
- 1—Joy Triple Drum, 30 HP.

LABORATORY EQUIPMENT

- 1—Sturtevant Jaw Crusher, Size 6" x ½" opening.
- 1—Sturtevant Roll Crusher, Size 5" x 7".
- 1—Sturtevant #339 Disc Grinder, 10" dia.
- 1—Lot of Miscellaneous, comprising complete lab. Tables, Glassware, Scales, Furnaces, etc.

LOCOMOTIVES

- 2—G.E. Diesel Electric, 60 Ton, 425 HP, Cooper-Bessemer Engine, S/N 13142 and 15091.
- 4—G.E. Electric Mine Type, Model IME2C4-A6, 4 ton Cap. 36 Gauge.

MACHINE SHOP EQUIPMENT

- 1—Toledo 2" High Speed Pipe Threader and Cutter.
- 1—Williams 6" Pipe Threader & Cutter.
- 1—Acme Bolt Threader, Model BB-2793.
- 1—Saunders Threader & Cutter.
- 1—Shumaker Lathe, 34" x 12".
- 3—Wilson Arc Welders, 250 and 400 AMPS.
- 1—Aurora Drill Press.

MISCELLANEOUS

- 1—Crocker Wheeler 50 KWMG Set 75 HP.
- 1—G.E., 6 KWMG Set, 10 HP.
- 1—Elmco Mucking Machine No. 21, 36 Gauge.
- 1—Broughton Mixer, 54" L x 48" W x 28" D.
- 1—Large Lot of miscellaneous supply items. Valves, pipe, drill bits, cable, wire sheaves, bearings, starters, etc. Approximately \$50,000 replacement inventory including spare parts. (All unused).

PUMPS—CENTRIFUGAL

- 3—IR Model 1½ CNTS, 200 GPM, 75 Hp.
- 2—IR Model A, 300 GPM, 230' Head, 30 Hp.
- 2—IR Model A, 200 GPM, 430' Head, 40 Hp.
- 1—IR Model A, 200 GPM, 230' Head, 20 Hp.
- 1—IR Model B, 50 GPM, 130' Head, 3 Hp.
- 1—Deming Deep Well, 8 Stage, Figure 4700, No. 12, 100 Hp.
- 1—Deming 8", 2500 GPM, 160' Head, 150 Hp.
- 1—Worthington, 8", 2500 GPM, 160' Head, 150 Hp.
- 2—Worthington, Model 5-LG-1, 8", 100 Hp.
- 1—Worthington, 4-Stage, 35 Hp.

PUMPS—SAND

- 2—Wiley, 1", Model CA, 5 Hp.
- 2—Wiley, 2" Model CA, 7½ Hp.
- 7—Wiley, 3", Model CA, 20, 25, 30, & 40 Hp.
- 3—Wiley, 4", Model CA, 20, 25, & 30 Hp.
- 1—Wiley, 8", Model CA, 100 Hp.
- 1—Linatex, 3" Model M., 200 GPM, 40' Head.

RAILROAD TRACK

- 1500 Tons—80, 90 & 100 lb. relaying rails. Including all accessories.

SCREENS—VIBRATING

- 3—Tyler "Ty-Rocks" 5' x 12", Double Deck, type 600, with Fines Hoppers, 10 Hp.
- 7—Tyler "Hummers", 4' x 5', Type 38, Single, Deck, wet or dry.
- 1—Tyler "Hummer" 4' x 6', Single Deck.
- 1—Tyler "Hummer" 3' x 5', Single Deck.
- 1—Tyler "Hummer", 2' x 4', Single Deck.

SIZER

- 1—Dorr Fahrwald, Type EX-8, 8-Pocket, 8/N US7864.

TABLES CONCENTRATING

- 8—Deister Triplex—Plateau Deck—4RH, and 4LH, Intermediate, 2 Hp.
- 16—Deister Simplex—Plateau Deck—4RH, and 4LH Coarse, 2 Hp.

THICKENERS

- 2—Door 30' Dia. Type AX Mechanism.
- 1—Door 80' Dia. S/N 457865.

TRANSFORMERS

- 2—Wagner, 1500 KVA, 33,000/2300 Volts.
- 1—Westinghouse, 300 KVA, 2400/480 Volts.
- 2—Allis Chalmers, 200 KVA, 2400/480 Volts.
- 3—Westinghouse, 150 KVA 4800/2400, 480/240/120 Volts.
- 3—G.E., 50 KVA 2500/120 Volts.
- 3—Westinghouse, 37.5 KVA, 2200/440 Volts.
- 3—Westinghouse, 37.5 KVA, 2400/240/120 Volts.
- 22—Miscellaneous Transformers, 5-10-15-20 and 25 KVA.

VACUUM FILTER

- 1—Dorr Continuous 10' x 5' Face, 155 Sq. Ft. Filter area, with 40 Hp. vacuum pump, cap. 40 TPH.

WEIGHTOMETER

- 1—Merrick Model "E", 20' Belt, 8/N 423.

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AAA Machinery & Equipment Co.

MINING MACHINERY DIVISION — P.O. BOX 175

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JOY EQUIPMENT—REBUILT

- 3-Joy 14BU 9AE Super Loaders—26" Hi—New 1958.
- 2-Joy 14BU Loaders, low pedestal, 7AE, 1956 & 57.
- 4-Joy 14BU Loaders, medium pedestal, 7RBE.
- 2-Joy 14BU 7CE high pedestal loaders.
- 4-Joy 14BU 3PE Loaders.
- 2-Joy 12BU Loaders complete with Piggybacks.
- 2-Joy 12BU Loaders, 9E, latest type, 250 V. D.C.
- 3-Joy 12BU Loaders, 220/440 Volt AC.
- 1-Joy 20BU Loader, latest type.
- 4-Joy 11BU Loaders, latest type.
- 1-Joy 8BU Loader, 34" overall height.
- 1-Joy 8BU Loader, 220 V. AC.
- 1-Joy curved Bar Head for 14BU, complete
- 6-Reliance 24-J Motors, 7½ H.P.
- 4-Reliance 38-J Motors, 10 H.P.
- 4-Reliance 40-J Motors, 15 H.P.
- 20-Reliance 9-J Motors, 4 H.P.
- 2-Goodman 660 loaders on Crawlers 220/440 V. AC, like new.
- 1-Goodman 660 Loader on Crawlers, excellent 250 V. D.C.
- 1-Goodman 665 Loader on Crawlers, latest type 250 V. D.C.
- 1-Goodman 865 Loader, 26" hi. Rebuilt. 250 V. D.C.
- 4-Joy 85C Shuttle Cars, 26" hi., rebuilt.
- 5-85C Shuttle Cars, as removed from service. 26" hi.
- 4-Joy 65C Shuttle Cars, rebuilt, latest type.
- 6-Joy 65C Shuttle Cars, as removed from service.
- 1-Joy 55C Shuttle Car. Excellent.
- 2-Joy 32E9 Shuttle Cars.
- 2-Joy 32E10 Shuttle Cars, rebuilt.
- 6-Joy 32E15 Shuttle Cars, rebuilt.
- 4-Joy 32E16 Shuttle Cars, rebuilt.
- 10-Joy 42E16 Shuttle Cars, rebuilt and as is.
- 1-Joy CD-22 Drill, on rubber, like new.
- 6-Joy T-2-5 low pan Crawler Trucks, rebuilt.
- 1-Joy T-2-6 low pan Crawler Truck with reel.
- 2-Joy T-1 Standard Crawler Trucks, 220 AC.
- 1-Joy T-1 Standard Crawler Truck, 250 DC.
- 4-Joy 11-B Cutting Mach., like new, 35 & 50 H.P.
- 4-Joy 7-B Cutting Mach., like new, 250 & 500 V.
- 4-Goodman 212 Cutting Machines, 19" high.
- 2-Goodman 312 Cutting Machines, 17" high.
- 2-Goodman 412 Cutting Machines, 19" high.
- 1-Goodman Machine on Crawler, 31" high. All hydraulic.
- 6-Goodman 512 Machines with Bugdusters. Rebuilt and as removed from service.
- 6-Goodman 612 Cutting Machines, 250 and 500 volt.
- 1-Jeffrey 70 RUBR rubber tired cutter, Universal head, perfect condition.
- 1-Goodman 2410 Rubber Tired Cutter, Universal head, like new.
- 2-Joy 11RU Rubber Tired Cutters with Bugdusters, Universal heads, dual tires, like new, 250 V. D.C.
- 1-Joy 10RU Rubber Tired Cutter, Universal head, 220/440 V. A.C. Perfect.
- 4-Joy 10RU Rubber Tired Cutters, Universal head, 250 V. D.C. Rebuilt or as is.
- 6-7AU's on track. Universal head.
- 2-Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38" high, on Crawlers, 250 volt D.C.
- 4-Jeffrey 29LC on Crawlers, rebuilt or as removed from service.

LOCOMOTIVES

- 1-Goodman 6 ton, 93-A, 27" hi, armor plate frame.
- 1-Jeffrey 15 ton MH-77 Locomotive, armor plate frame.
- 2-Jeffrey, 13 ton, Type MH-110, 36", 42", 44" ga.
- 2-Jeffrey, 10 ton, type MH-110, 42" and 44" ga.
- 2-Jeffrey, 10 ton, type MH-78, 42" and 44" ga.
- 2-Goodman 8-30 and 10-30 Locos., 26" above rail.
- 1-Jeffrey MH-150, 6 ton, 26" overall height, rebuilt with reel.
- 12-Jeffrey, 6 ton, type MH-88, 42", 44" and 48" ga.
- 4-Jeffrey, 8 ton, type MH-100 2½" armor plate frames.
- 3-Jeffrey, 4 ton, type MH-96, 42", 44", 48" ga.
- 1-G.E., 4 ton, type 825 Locomotive, 22" high.
- 10-G.E., 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" ga.
- 1-G.E., 8 ton, type 822 Locomotive, 44" ga.
- 3-G.E., 10 ton, type 809 Loco., 42", 44", 48" ga.
- 2-G.E., 13 ton, type 829 Loco., armor plate frames.
- 1-Goodman 91A Loco., 8 ton, 26" overall ht.
- 2-Goodman, type 33, 6 ton, 44" and 48" ga.
- 3-Westinghouse type 902, 4 ton, 42" and 48" ga.
- 1-Atlas Battery Locomotive 36" ga.
- 1-Atlas Trolley Locomotive, 4 ton, 24" high.
- 2-Westinghouse, type 904, 6 ton, 44" and 48" ga.
- 2-Westinghouse, type 906, 44" and 48" ga.
- 2-Westinghouse, type 907, 10 ton, 44" & 48" ga.
- 3-Westinghouse 908, 13 ton, Loco., 42" & 48" ga.

- 8-Jeffrey MH-78 Locomotive Units, cheap.
- 4-Jeffrey MH-88 Locomotive Units, real bargains.
- 6-Jeffrey MH-100 Locomotive Units, reasonable.
- 3-Plymouth Diesel Locomotives, 8 and 10 tons, 42" and 44" ga.

Locomotive Trucks & Spare Armatures for the above.

- 1-All Steel 5 Track Tipple, new 1957, complete with washer, silo, oil treating system, all bolted construction.
- 1-Complete Five Track Tipple with Washers and Air Tables.
- 1-Complete stoker plant, all steel.
- 2-Complete tipples, 3 & 5 track, steel and wood.
- 3-Cleaning Plants, 1 Ea. McNally, Roberts and Schaefer, Jeffrey, Washers and Air-Flo Tables.
- 4-Complete Aerial Trams for coal or refuse.
- 3-Complete Rope and Button Lines.
- 2-Monitor Lines complete with Drums, excellent.
- 1-Allis-Chalmers 5' x 12' Ripflo Vibrator.
- 1-Allis-Chalmers 4' x 12' Low-Head Vibrator..
- 1-Robins Gyrex Vibrator, 4 x 10.
- 10-Belt and Apron type Loading Booms.
- 6-Shaker Screens.
- 1-Robins Car Shakeout.
- 1-Gundlach Crusher, like new.
- 20-Crushers, various sizes—Jeffrey, Link-Belt, Mc-Lanahan & McNally.
- 4-Mine Scales, 10 & 20 ton.
- 5-Truck Scales, 25 to 40 ton, New & Used.
- Feeders, Belt and Drag Conveyors, Car Retarders.

CUTTING MACHINES

- 1-Joy 10RU Rubber Tired Cutter, Universal head, 220/440 volt A.C. Perfect.
- 3-Joy 10RU Rubber Tired Cutters, Universal head, 250 V. D.C. As is or rebuilt.
- 2-Joy 11RU Rubber Tired Cutters, 250 V. D.C.
- 1-Goodman 2410 Rubber Tired Cutter, Universal head, new 1956. Excellent.
- 2-Jeffrey 29UC Universal Machines on Crawlers.
- 1-Goodman on Crawlers, 31" overall height.
- 1-Baby Goodman 212's, rebuilt, 250 V. D.C.
- 2-Goodman 312 Cutting Machines, 17" high.
- 3-Goodman 412 Cutting Machines, 19" high.
- 6-Goodman 512's, with Bugdusters, like new.
- 4-Goodman 512's, rebuilt, or as removed from service.
- 6-Goodman 612's—250 & 500 Volt.
- 3-Goodman 112's, 220/440 V. A.C.
- 4-Joy 7-B Cutting Machines, 250 and 500 Volt.
- 4-Joy 11B Cutting Machines, rebuilt, 35 & 50 H.P.
- 6-7AU's, on track, Universal Head.
- 10-Goodman 12AA's and 112AA's, 250 V. D.C.
- 2-Goodman 324 Slabbers.
- 2-Goodman 724 Slabbers.
- 2-Goodman 824 Slabbers.
- 6-Jeffrey 35L's, like new, 250 V. D.C., 17" high.
- 2-Jeffrey 35L's, on low vein trucks.
- 3-Jeffrey 35BB's, 220/440 A.C.
- 15-Jeffrey 35B's and 35BB's 250 V. D.C.
- 2-Jeffrey 29B's on track.
- 10-Jeffrey 29C's, track mounted.
- 2-Jeffrey 29L's, on Crawlers. Excellent.
- 4-Sullivan CE7, 220/440 V. A.C.

CONVEYORS

- 2-Joy 1200' Belt Conveyors, 30". "Limberoller," like new.
- 1-Each 30" and 36" Joy 100B' extensible belt, latest type, like new.
- 1-Goodman 97HC 30" Rope Belts, 1000' perfect. With or without rubber.
- 4-Jeffrey 52-B tandem drive 30" and 36" Belt Conveyors, 600' to 2000'.
- 1-Jeffrey 52-B tandem drive 26" Belt Conveyor.
- 1-Joy 30' Underground Belt Conveyor, Excellent.
- 1-Goodman 97-C, 30" tandem drive.
- 1-Robins 36" tandem drive, with or without motor.
- 5,000' 52-B Belt Structure, 30".
- 1,000' Conveyor Belt, 42".
- 1,500' Conveyor Belt, 36".
- 2,000' Conveyor Belt, 30".
- 1,000' Conveyor Belt, 26".
- 8-Jeffrey 61AM 12" Chain Conveyors, 300'.
- 2-61WF Elevating Conveyors.
- 2-61WH 15" Room Conveyors, 300'.
- 2-Joy 15" Room Conveyors, 300'.
- 2-Joy 20" Conveyors, 300'.
- 4-Joy Ladel UN-17 Shakers.
- 10-Goodman G-12½ and G-15 Shakers.
- 1,000' Goodman 18" Flat Belt Conveyors, tandem drive any length. Perfect.

CONVERTERS AND DIESEL PLANTS

- 1-300KW G.E. Stationary Rectifier.
- 2-500KW G.E. Stationary Rectifiers.
- 4-1,000KW Stationary Rectifiers.
- 2-100KW G.E. TCC-6's, 275 V., Rotary Converters.
- 1-150KW G.E. HHC-6, 275 V., Rotary Converter.
- 1-150KW, 6 phase, Allis-Chalmers Rotary Converter, 275 V. D.C.

- 2-200KW G.E. HCC-6's, Rotary Converters, 275 V. D.C. Steel frames. Newly rewound.
- 3-300KW G.E. HCC-6's, Rotary Converters, 275 V. D.C. Like New.
- 2-300KW Westinghouse, 6 phase, Rotary Converters, 275 V. D.C.
- 2-500KW West. Rotary Converters, 275 V. D.C.
- 1-200KW Westinghouse Rotary Converters, 275 V. D.C. Newly rewound.
- (All of the above with 6900/13000 and/or 2300/4000 primary transformers)
- 1-50KW MG Set.
- 1-100KW MG Set, 275 V. D.C.
- 6-150KW MG Sets, G.E. and West., 275 V. D.C.
- 2-200 KW MG Sets, West., rebuilt, 275 V. D.C.
- 1-200KW MG Set, G.E., perfect, 275 V. D.C.
- 2-300KW G.E. MG Sets, like new.
- 3-300KW Westinghouse MG Sets, 275 V., rebuilt.
- 1-300KW Westinghouse, 600 volt MG Set, rebuilt.
- 2-200KW G.E. Rotary Converters, 600 V. D.C.
- 2-300KW West., 600 volt, 6 phase, Rotary Conv.
- 4-300KW G.E. Rotary Converters, 600 V. D.C.
- 2-500KW Westinghouse, 600 volt, D.C., 6 phase, Rotary Converters.
- 2-500KW G.E., HCC-6's, Rotary Conv., 6 phase, 600 V. D.C.
- 3-GMC-671 Diesels w/75 & 110 KW, 250 V. D.C.
- 1-Int. UD-14 Diesel with 50KW, 250 V. D.C. Gen.
- 1-GMC-471 Diesel with 60KW, 250 V. D.C. Gen.
- 1-100KW Natural or LP Gas Engine with Generator.

LOADING MACHINES

- 16-Joy Loaders, 14BU, 12BU, 8BU, 11BU, 20BU.
- 5-Joy 12BU9E Loaders, 220/440 V. A.C. Excellent.
- 3-Joy 12BU9E Loaders, latest type.
- 2-Joy 12BU with Piggyback Conveyors.
- 2-Goodman 865 Loaders, 26", on Crawlers.
- 1-Goodman 665 Loader, on Crawlers, rebuilt.
- 2-Goodman 660 Loaders, 440 V. A.C., perfect.
- 1-Goodman 660 Loader, on Crawlers, 250 V. D.C.
- 1-Goodman 460, on track, rebuilt, all hydraulic.
- 2-Jeffrey 61 CLR's, on rubber, 26".
- 3-Jeffrey L-500 Loaders.
- 2-Myers Whaley, No. 3 Automatic Loaders.
- 2-Clarkson Loaders, 26" above rail.

MISCELLANEOUS

- 1-Jeffrey 76-A ColMol, 220/440, perfect.
- 1-Joy 5 JCM Continuous Miner, 220/440, perfect.
- 150 Tons Copper—4/0 and 9 Section Trolley 1/0, 2/0, 4/0 Stranded. 500 MCM, 750 MCM—1,000,000 MCM Insulated.
- 1-Each 4'-5' 6" & 8" Hi Pressure Joy & Jeffrey latest type fans.
- 1-Complete Five Track Tipple with Washers and Air Tables.
- 5-Complete Tipples, 3 to 5 track. Wood and Steel.
- Steel Trestles for drop bottom cars.
- All Steel Armo Buildings.
- 20-Jeffrey Molveyors on rubber tires.
- 1-¾ Yard Shovel and Back-Hoe.
- 2-¾ Yard Shovel Cranes. Gas.
- Battery Supply Tractors, Rubber Tired.
- 1-Cantrell Air Compressor on rubber tires.
- 10-Air Compressors, 1 H.P. to 40 H.P.
- 1-Joy self-propelled rubber tired comp., 240 cu. ft.
- 1-Acme self-propelled rubber tired compressor, 130 cu. ft.
- 40-Mine Pumas, all types.
- 1-Differential 40 Passenger Man-Trip Car.
- 6-MSA Rock Dusters.
- Joy Roof Drills—Schroeder Coal Drills.
- 2-Phillips Carriers, 44" and 48" ga.
- 1-Barber-Greene self-propelled Bucket Elevator.
- Pipe, Plastic, Steel, Transit, all sizes 1" to 6".
- 25,000 Roof Bolts, all types.
- 300-Mine Cars, drop bottom, 42", 44", 48" ga.
- 300-Mine Cars, 18" hi., end dump, 42", 44", 48" ga.
- 1-10 ton Mine Car with Recorder.
- 4-Brown Fayro 15 HP latest type Hoists.
- 15-Brown Fayro HKL and HG Car Snotters.
- 1-Brown Fayro Hydraulic Car Snotter.
- 1-12 ton Differential Slate Larry.
- Incline Hoists, 25 to 150 H.P.
- Shaft Hoists to 700 H.P. Complete.
- 1-Jeffrey 5', 6" & 8" Aerodrive Fans. Like New.
- 6-Storage Tanks, 6000, 8000, 10,000 gallons.
- Huge Stock of Mine Supplies.
- 600—MSA Mine Lamps, Chargers, etc.
- 4-Mine Scales, 10 & 20 ton.
- 5-Truck Scales, 25 to 40 ton, late type.
- Mack & International tandem dump trucks.
- Latest type Saw Mill, complete.
- THOUSANDS OF OTHER ITEMS.

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STRIPPING PRODUCTION INCREASED 50%

POWER SHIFT D8H VS. STANDARD SHIFT TRACTOR.

There's no guesswork about the outcome of this contest. Shortly after the new D8 Series H was added to the stripping spread on this former deep mining operation near Centralia, Pa., the operator reported a 50% increase in production over their previous 185 HP tractor.

Sanchez Construction Co., Minersville, Pa., is using the new D8H to doze spoil deposited by a 5-yard dragline. They have to strip 90 feet of rocky overburden to reach the 15 to 20 foot seam of coal. Foreman Peter Stanchock cites three major factors for the D8H's production bonus: new power increase; clutchless, one-lever power shift and the tremendous pry-out action of the hydraulic tilt cylinder on the U-shaped bulldozer.

Brawny New Power: The D8H power plant delivers 235 HP all day long, without straining. It's turbocharged for greater power and efficiency, responds instantly to controls, has a 20% torque rise.

Clutchless Shifting: Keeping ahead of the dragline can be a wearing, back-breaking job, but not if you're riding on top of a power shift D8H. One handy lever gives you instant changes of speed and direction, permits you to maneuver your machine quickly to match terrain and load conditions. Costs go down, production up with effortless Cat power shift. It's easy, efficient and essential in today's profit-squeezing coal market.

Hydraulic Tilt Cylinder: This efficient attachment is a big production booster in stripping work. At the touch of the foot control you can tilt the dozer blade to make a fast cut in a bank or pry out a stubborn boulder. Concentrated power at the corner of the blade makes fast work of tough jobs like this, speeds up the whole dozing operation. (Better than 90% of the new tractor prospects who have seen this attachment demonstrated have bought it.)

If rising costs are beating down your efforts to maintain a decent profit margin, the power shift D8H may be the answer. Your Caterpillar Dealer will be glad to discuss this machine and its mine-engineered attachments in terms of your job and present facts and figures so you can determine true benefits. If you're interested, he'll demonstrate so you can measure results.

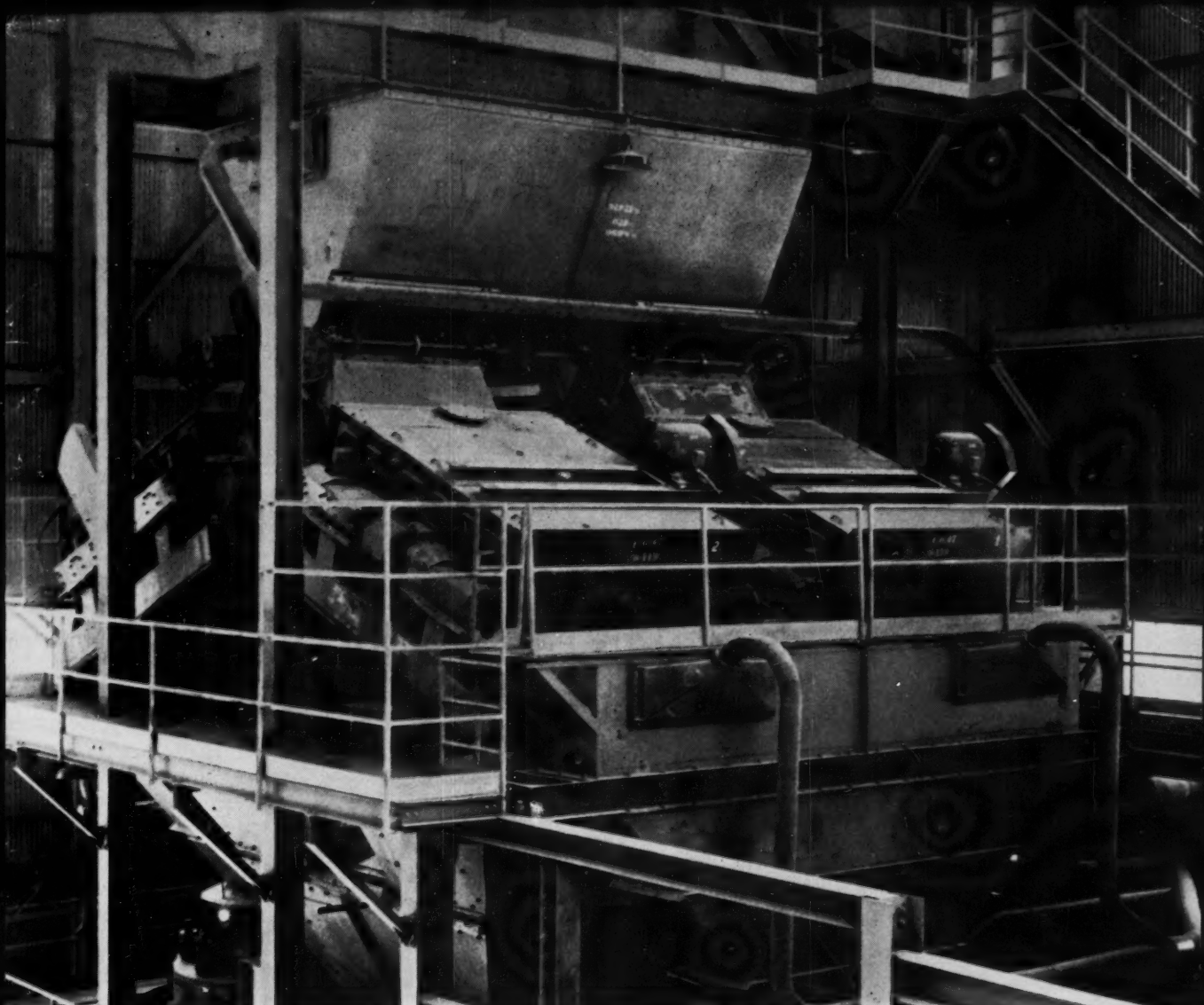
Call him today.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

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**NEW CURE FOR
SHRINKING PROFITS:
CAT POWER SHIFT D8H**



In 7 years of operation Tyler Ty-Rocks screen 15,000,000 tons of ore at Silver Bell Mine... "maintenance virtually nil"

These four single-surface Ty-Rock screens at the Silver Bell Mine of American Smelting and Refining Company have screened mountains of copper ore. Yet in seven years of operation the company reports "no bearing or other major replacements, and maintenance virtually nil"... a tribute to the fine operating staff and to the design of the equipment.

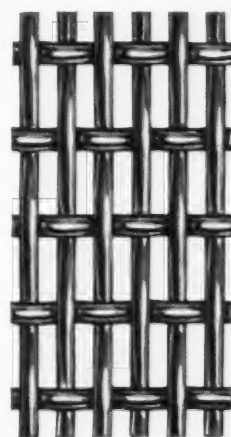
Tyler vibrating screens handle tremendous outputs with very high reliability. And no matter what your screening requirements, Tyler can handle them: heavy duty mechanical screens, electric screens, economical two-bearing screens. And—Tyler is the world's largest manufacturer of wire cloth and fabricated screen sections.

For screening equipment perfectly matched to your needs check with Tyler.

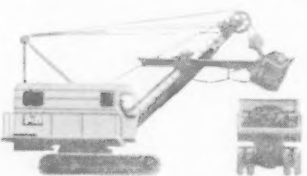
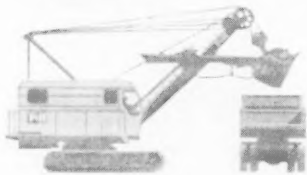
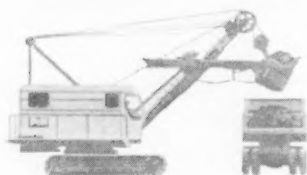
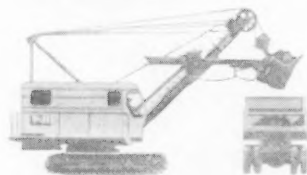
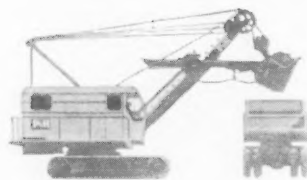
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**HOW
MUCH
DIFFERENCE
DOES
MAGNETORQUE
MAKE?**



**THIS
MUCH!**



EVERY 7th WORK CYCLE
IS "ON THE HOUSE" with Magnetorque-equipped P&H. Fast swings and smooth control slice 15% off usual cycle time . . . give *seven* loads in the time other machines produce *six*.

Magnetorque—a patented P&H electromagnetic system—is more than just a superior clutch. It's a complete departure from conventional designs . . . employs magnetic force instead of friction to control swings. No adjustments, no overheating. There are no linings—so there is no downtime for lining replacements. The only main-

tenance with Magnetorque is the replacement of inexpensive carbon brushes every few years.

Magnetorque belongs to P&H—you can't get it on any other make of machine. If you could, it would cost you a minimum of \$5,000 extra. But it's another of the *standard* bonus features that are part of the bargain with a P&H. Write for more information and special booklet on Magnetorque.

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